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Minimum quality standards for genebank operations



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1. Introduction

Plant genetic resources (PGR) form the raw material for plant breeding; without PGR no new crop varieties can be developed, and agriculture will not be able to adapt to changes in the environment, agricultural practices or consumer demands. The world needs to conserve its PGR, since otherwise they will disappear due to genetic erosion and/or extinctions caused by anthropization, climate change, changes in agricultural practices and other deleterious causes.

There is a range of synergistic approaches for conserving PGR. For example, crop wild relative populations can best be conserved in their original environment (*in situ*, often in nature) provided that this environment is sufficiently stable; fruit trees are best conserved in the orchards where they are generally grown (on-farm), and cereal and horticultural crop seeds best in genebanks where they can be dried, frozen and stored for many decades (*ex situ*) (Engels & Visser 2003). To increase the security of the fruit trees on-farm, it is wise to also store some buds in liquid nitrogen *ex situ*. Moreover, to increase access to the crop wild relatives in nature and traditional crop varieties on-farm, the infrastructure of genebanks could be used as a conduit to link the *in situ* conserved resources to germplasm user access (van Hintum *et al.* 2021). As far as reliability of the conservation and access to the germplasm for the professional user community are concerned, *ex situ* seed collections are generally considered to be the most efficient approach, as long as they can be stored in dried and frozen form. Luckily, most of our agricultural and horticultural crops can be stored in that way (FAO 2013).

Obviously, no single genebank or single country can conserve the world's PGR alone. Collaboration and division of tasks is crucial to get the work done collectively. However, this requires mutual trust. One genebank will only be able to rely on another genebank if this latter genebank functions at an appropriate level using mutually agreed standards. In Europe, the PGR community (hereinafter the community), as organised in the European Cooperative Programme for Plant Genetic Resources (ECPGR), agrees that the way forward is to support genebanks in reaching an appropriate quality level and create a mechanism to ensure that it is conserved over time. In its 'Plant Genetic Resources Strategy for Europe', published by ECPGR and launched on 30 November 2021 for the EU in Brussels, the community formulated, as an objective, the establishment of 'a certification system, that is economically sustainable and accessible to genebanks and collection holders' (ECPGR 2021).

Assuring genebank quality, ideally through a certification system, requires various elements. First of all, genebanks need to have a proper quality management system (describing what is done and how). Secondly, it should be clear what is considered an appropriate level of operation, the minimum quality standards for genebank operations; 'what is good enough?'. Additionally, to make the step to a certification system, an independent mechanism needs to be created that can verify that the procedures comply to the standards and that these procedures are actually followed.

This deliverable describes the second element of this list: the appropriate level of operation, the minimum quality standards for genebank operations.

2. Activities

An inventory of the available standards for genebank operations was made and discussed with partners in the project. Conclusions were drawn regarding (1) the suitability and applicability of existing standards, and (2) the need and possibility for further development of these standards.

Based on the results of the inventory and the discussions with the partners, a survey amongst the European genebanks was held. A list of contacts was compiled using the 'genebank contacts' from the partners of the PRO-GRACE project, the members of the newly established ECPGR Genebank Managers Network, the lists of

‘AEGIS Associated Members’ and the ‘EURISCO National Focal Points’ and correspondence with various people. The resulting initial list with 103 names was reduced by deleting people who were not associated with genebanks and selecting just one name per genebank. The result was a list of 61 genebank managers (the full list of genebank managers is included in Annex 1 page 18). The genebanks were all European National genebanks except three: the World Potato Centre CIP in Peru, the World Vegetable Centre WorldVeg in Taiwan and the regional genebank of the Nordic countries Nordgen (all PRO-GRACE genebank contacts). The remaining 58 originated from 36 European countries (including Turkey and Israel), most of which were represented by one genebank, except Italy (2 genebanks), Portugal (2), Slovenia (2) Switzerland (2), Spain (4), UK (6) and France with contacts from 11 genebanks. These genebanks were approached and requested to fill in the survey. In total 43 replies were received, and since some replies covered several genebanks, 60 genebanks were represented in the answers. The total number of genebank accessions covered by the survey was 1,053,491, a substantial part of the European holdings.

The results of the survey were analysed on the background of the content of EURISCO (Kotni *et al.* 2022) and the AEGIS Genebank Manuals (ECPGR 2023c).

The survey resulted in valuable information regarding the status of quality management in European genebanks, the use of standards and the need for certification. A detailed report of this exercise is appended to this deliverable (Annex 1), the main results are included in the presentation of the results below.

3. Results

3.1 Domain – what operations should be included?

When discussing the standards required to define an ‘appropriate level of operation’, the first step is defining the domain of these standards. A genebank, like any institution, is involved in many activities, collaborations, as well as institutional, social, and legal issues. The decision about the domain requires an answer to the question as to which of these activities should be covered by the standards for a certification system. It could include the diversity or working conditions of its employees; the environmental impact of the conservation activities, and it could also include components dealing with the financial and institutional stability of the genebank. In any case, it should cover the aspects that determine the reliability of the conservation (‘can we be sure that the accession stays alive and maintains its genetic integrity?’) and the access (‘can we be sure that the accession is and will stay available to users?’). These two issues, conservation and access, are the two crucial genebank-specific issues that need to be covered. Other issues could be considered and added later.

Regarding standards for the *ex situ* conservation of PGR, also a focus is required. There is a very wide range of potential methodologies available, including and most prominently collections of orthodox seeds. (‘Orthodox seeds’ are seeds whose lifespan can be considerably extended by drying and freezing, as opposed to ‘recalcitrant seeds’). However, genebanks also conserve material in field collections (usually trees and shrubs), or *in vitro* collections (cell cultures on media in slow growth conditions). This concerns mainly perennial and/or clonally propagated crops or crops with recalcitrant seeds, and thus not suitable for dry and frozen storage (Ellis *et al.* 1985). In some cases, material, generally small seed or pollen, is stored in liquid nitrogen (cryopreservation), a methodology that is also used for safety back-up of material that is conserved *in vitro* (Engelmann 2004) or in the field (Volk & Bramel 2021). But one could go further and think about cell cultures or DNA collections (Engels & Visser 2003).

In practice, most PGR are conserved *ex situ* as dried frozen seeds. There are no reliable estimates available, but it is expected that over 90% of PGR conserved *ex situ* concerns seeds in freezers. Genesys, the ‘online platform where you can find information about Plant Genetic Resources for Food and Agriculture (PGRFA) conserved in genebanks worldwide’, lists 3,641,488 PGR accessions, excluding *Arabidopsis* (Genesys 2023).

92.0% of these accessions are stored as seed collections, 6.1% as field collections, 1.2% as *in vitro* collections and 0.6% in other ways. Given the coverage of this database, which includes primarily relatively well-organised, large collections, it is expected that the material not included in Genesys is conserved in seed collections to an even larger extent, as this is the easiest and most cost-effective way of conserving. It is also worth noting that the value of PGR is not just in their preservation, but primarily in their access and use, and genebanks are the established and routine means of access to the conserved resources by breeders and other germplasm users. As an illustration of the role of germplasm suppliers, the statistics of the germplasm distribution of the Dutch national genebank, The Centre for Genetic Resources, The Netherlands (CGN) from 2014 – 2023 is shown in **Fig. 1**. (data supplied by Theo van Hintum, CGN).

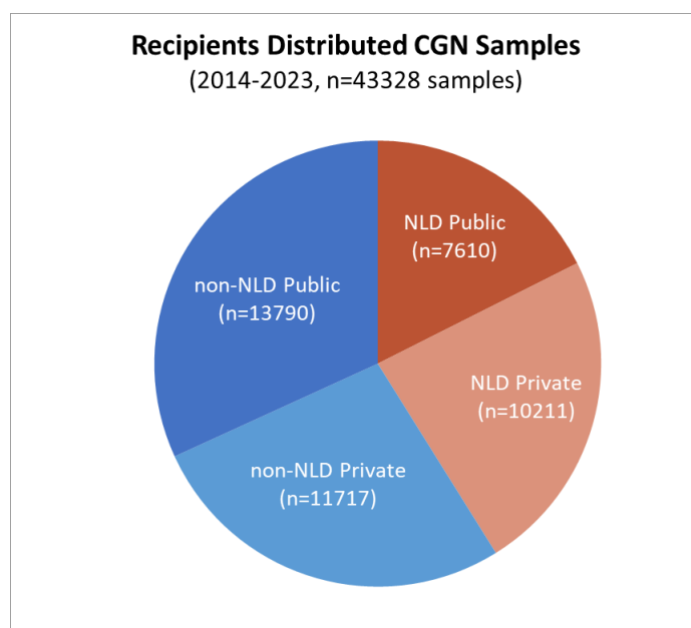


Figure 1. Germplasm distribution from the Dutch national genebank CGN from 2014 – 2023 to recipients worldwide. ‘NLD’ stands for the Netherlands, ‘Public’ refers to public institutions including universities, research organizations and genebanks, ‘Private’ to (mainly) breeding companies.

Therefore, the initial design of the certification system, and thus ‘the minimum quality standards for genebank operations’ will be focused on seed collections, their conservation and access. Other approaches can follow once the methodology has been established for this most applied approach.

3.2 Level of detail of the standards

Defining standards can be done at various level of detail. For example, ‘An accession should be available for use’ could be considered the standard for access, but obviously it should be clear what that availability means:

- are seeds readily available for shipment or is it acceptable if the accessions first need to be regenerated?
- has the material been tested for phytosanitary issues (what issues were tested?) and if yes, what happens if a new plant disease arises?
- who can request?
- how quickly should the request be handled?
- what material transfer agreement (MTA) is used?
- is there a fee to be paid or are the seeds shipped ‘for free’?
- can a user request the entire collection and receive it, or is there a limit to the size of the request and the number of requests, can a user request the same accession every year?
- are all accessions conserved in genebanks legally available for distribution to all countries?

- etc.

Similar questions can be asked regarding all aspects of conservation. For example, ‘The accession should be regenerated in a way that maintains its genetic integrity’ should be the standard for regeneration, however there are species specific considerations to be taken into account:

- what is the appropriate number of plants to use, and is that dependent of pollination system and/or growing conditions?
- what to do if regeneration is very difficult and only very few plants grow to flower and form seeds?
- is spatial isolation acceptable for cross-pollinating species, and if yes, what distance should be applied, does this depend on the use of isolating crops or the climate (wind) at the regeneration site, if no, what alternatives should be used for isolation?
- what quality (viability, phytopathological status) and quantity of seeds should be produced?
- etc.

Generic answers to these questions do not exist and the various guides such as Engels and Visser (2003), Sackville, Hamilton & Chorlton (1997) and FAO (2022) do not provide clear answers.

Deciding on the appropriate level of detail is very difficult and decisions might change over time based on new insights. Generally quality management tries to assure that the goal is reached, and the ability, in terms of human capacity and facilities, to do so is available. So, the standard ‘The accession should be regenerated in a way that maintains its genetic integrity’ could be sufficient as long as there is a qualified authority to judge if the applied procedures meet this goal. These decisions should be recorded and will, *de facto*, give the details in their context for the standards that are applied.

On the other hand, the decisions have to be, to a certain extent, arbitrary. For example, the decision if the regeneration procedure sufficiently guarantees genetic integrity requires an indication of what is considered sufficient. This could be defined in ways such as ‘an allele occurring with a frequency of 2.5% or more should be maintained in the accession with a likelihood of 95% or more’. Such definitions obviously imply much more precision than can be determined in practical situations, but they can guide the development and evaluation of procedures. Furthermore, there will be cases where exceptions have to be accepted, since not accepting these would incur excessive costs or loss of diversity – think of the accession that refuses to flower in sufficient quantities, how often should a genebank try, how much money should it spend on that one accession? Is recollecting an option?

A level of compromise needs to be sought, standards should be primarily formulated to express the aim of the activity, providing as much detail as needed to judge if a procedure conforms to the standard. This was, necessarily, also the approach of the FAO Genebank Standards (FAO 2013). Exceptions (deviations from the procedure) can be accepted, provided that they are motivated (the exception must be justified) and recorded. This is common practice in quality management systems; they do not write in stone; they give the guidelines and ask justification for and records of deviations.

3.3 Inventory of available genebank standards

Given the importance of collaboration between genebanks, international organisations such as the International Board for Plant Genetic Resources (IBPGR), active between 1974 and 1993, already formulated standards. The earliest standards were probably the crop-specific descriptor lists, defining lists of traits and corresponding scales to be used when recording passport or characterisation and evaluation data (e.g., IBPGR 1983). The publication of descriptor lists has never stopped, although current technology might require new means of defining this type of standards. For the exchange of passport data between genebanks and aggregate databases (such as Genesys) a crop-independent standard was created that was widely adopted: the Multi-Crop Passport Descriptor List (FAO/Biodiversity 2015 – added as Annex 2 to this document) – this

list was incorporated in the Germplasm Extension of the Darwin Core ontology that is part of the Biodiversity Information Standards (TDWG, Endresen *et al.*, 2009).

Where it comes to standards for genebank operations, it was the Food and Agriculture Organization of the United Nations (FAO) that took the lead. Already in 1994 it published the first 'Genebank Standards', a condensed 17 pages long list of principles. To quote its preamble:

"In 1991, the Commission on Plant Genetic Resources considered it "essential that appropriate standards be developed for genebanks operating within the international network". The Commission requested "the convening of a panel of technical experts, to work in collaboration with FAO and IBPGR to assess and, if necessary, redefine genebank standards". It also agreed that the standards should take into account the advances in seed storage technology and the requirements of seeds of wild species. Subsequently, an FAO/IBPGR Expert Consultation was convened in 1992 to discuss and update the genebank standards that IBPGR published in 1985. The Genebank Standards recommended by the Expert Consultation were then endorsed by the 5th Session of the Commission on Plant Genetic Resources in April 1993. FAO and IPGRI recommend that these standards be widely utilized as the international reference in national, regional and international genebanks."

These Genebank Standards proved highly influential; many genebanks used it as a base of their methodology. Later some publications with practical guidelines for running a genebank were published, basically following and implementing the genebank standards, such as Rao *et al.* (2006), Engels & Visser (2003) and Smith *et al.* (2003).

In 2013, after a lengthy process of consultation of experts, a new expanded 'FAO Genebank Standards' was published (FAO 2013). This document provides the basis of genebank activities, specifying them for orthodox seed, field genebanks and *in vitro* and cryopreservation separately. The text lists - per topic - the related standards (a summary of these standards is appended in Annex 3). In addition to the standards, the document provides the context, explaining the rationale of the topic and standards, the scientific aspects, contingencies and selected references.

When ECPGR started the AEGIS initiative to set up a virtual collection of material maintained at agreed quality levels in various genebanks in Europe, there was the need for standards to define these required quality levels. It was agreed to adopt the FAO Genebank Standards, but it was also clear that without an authority to decide if the applied protocols were meeting the standards, the standards needed to be much more specific. It was decided to determine per crop or crop group what standards needed to be specified, and to formulate these specifications. For example, the FAO Genebank Standards defines the following standard for regeneration:

4.2 The regeneration should be carried out in such a manner that the genetic integrity of a given accession is maintained. Species-specific regeneration measures should be taken to prevent admixtures or genetic contamination arising from pollen gene flow that originated from other accessions of the same species or from other species around the regeneration fields.

AEGIS intended to define these 'species-specific regeneration measures' or, to quote Engels *et al.* (2009): *"The respective ECPGR Crop Working Groups will coordinate the processes of developing crop or crop gene pool specific technical standards for the routine conservation operations."* So far, this has been done for 15 crops or crop groups (ECPGR 2023a), in various levels of detail. These crops include wheat, *Vitis*, umbellifer crops, *Solanaceae*, *Prunus*, medicinal and aromatic plants, leafy vegetables, forages, cucurbits, *Brassica*, *Beta*,

Avena, vegetative propagated *Allium*, barley, grain legumes and *Malus/Pyrus*. Some crops limited this specification to a report of a discussion amongst experts, while others came with specific well-defined rules and/or produced crop-specific standard documents, adapted from the FAO genebank standards and formally agreed at the Working Group level (<https://www.ecpgr.cgiar.org/aegis/aquas/genebank-standards/agreed-standards>). For example, the umbellifer crop-specific genebank standards (Maggioni *et al.* 2014) specify the general standard for regeneration quoted above as follows:

- Randomly chosen plants for regeneration (no selection, except for obvious off-types)
- Use of insect-proof isolation cages
- Harvest in one single seed lot (quite balanced between plants)
- Regeneration repeated in case of insufficient amount of bolters or harvested seeds
- Limited number of regeneration cycles (such as every 15 years), to be recorded

These could also be seen as part of generic standards for cross pollinators regenerated in cages. (Some might want to use bagging combined with ring pollination as an alternative – would that be acceptable?). However, in some cases, the standards will become truly crop-specific such as, quoted from the cucurbits' standards (ECPGR 2011), this rule for melon (it illustrates the crop specificity that might be required):

“Before sowing, seeds may be disinfected. Disinfection can be done by maintaining seeds at a temperature of +76°C for 72 hours using dry heated air. Before the heat treatment seeds must be dried to a moisture content not higher than 6% (seeds with a higher moisture content may be damaged during the heat treatment).”

Since 2022 FAO has published 'Practical Guidelines for the Application of Genebank Standards' for the three approaches (orthodox seed, field genebank and *in vitro* and cryopreservation) separately (e.g., FAO 2022). They expand the content of the original 'FAO Genebank Standards' publication with many details and graphics, but in terms of content these manuals add very little to the original publication of the Genebank Standards in 2013.

3.4 Need to expand the available standards

The FAO Genebank Standards provide an excellent basis for the standards needed for a Genebank Certification System. Some standards would require reformulation to become better applicable or updated to incorporate new developments, such as the triplication of safety back-ups to Svalbard.

However, the philosophy of the FAO Genebank Standards can be copied one to one: make sure the material is properly conserved. However, the standards are clearly focussed on secure conservation of PGR, and less on providing access. A few elements are poorly defined, i.e., conditions for, and continuity of access and the phytosanitary status.

Since certification of genebanks aims to create a system of collaborating genebanks, each genebank should be able to rely on the conservation of, and access to the PGR in all certified genebanks; 'if you do it, I do not have to do it'. This implies that material should be accessible under standard and transparent conditions. For this reason, ECPGR decided to require the use of the Standard Material Transfer Agreement (SMTA) for all material included in AEGIS. Each participating genebank commits itself to provide access to AEGIS accessions under the SMTA in an Associate Membership Agreement. So far, 68 European genebanks have signed this agreement with ECPGR (ECPGR 2023b). The SMTA is the standard agreement formulated by the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA). It is a fixed contract between the provider and the user of genetic resources, which can be used if the PGR are to be used for research, breeding, or training for food and agriculture. It was designed for the use of specific PGR (included in Annex 1 of the

ITPGRFA) but can be used for all PGR. Adopting this policy, as advocated by ECPGR, of using the SMTA for all PGR transfers would create the desired open system of PGR exchange.

Another unresolved issue regarding PGR access is related to continuity. How can the genebank community guarantee that material is not withdrawn from the system due to institutional or political changes (imagine an institute or a country deciding not to distribute PGR abroad anymore). Obviously, the genebank would lose its certification, but what about the material in that genebank? Procedures need to be formulated that guarantee that material always stays in the system, for example by agreeing that safety duplicates can be 'activated' in case the original is no longer accessible.

Regarding the conditions for access many details need to be formulated, details that do not 'follow' from the principles as defined in the FAO Genebank Standards. These include (with possible solutions):

- Which users should be served?
 - Access should be prioritized for 'professional users'. A clear definition of these users should be made publicly available. Reasonable requests from other users should be also covered, preferably through seed conservation and distribution networks, acting as secondary distribution hubs.
- What requests for use should be prioritized?
 - Requests for 'research, breeding, or training for food and agriculture' should receive the highest priority. Genebanks should strive to satisfy other requests, according to their capacity.
- How many accessions should be made available per user (request or year) and can requests be repeated over years?
 - Blanket requests, such as "Please send me your entire collection for this crop" could be satisfied only to the extent to which they do not deplete the resources for normal function of the genebank and for satisfying other requests. Each genebank should elaborate and make public a conduct code with the criteria for prioritizing requests. Users should have the possibility to report rejected requests to the certifying agency, if they feel the criteria have not been respected in their case.
- Could some countries/genebanks be excluded from receiving materials?
 - This is a highly controversial issue, that needs to be discussed in the community. In principle, no boycott should be admissible on a purely geo-political basis, also because it could be easily circumvented via third countries. However, reciprocity rules could be considered, excluding countries whose genebanks systematically do not distribute their materials abroad or that do not adhere to international treaties facilitating PGR exchange. These rules should be evaluated periodically, using as a criterion their effectiveness in encouraging PGR open exchange.

A final unresolved issue that is only superficially mentioned in the FAO Genebank Standards is the phytosanitary status of the material. What should be required regarding this status in the Standards? Does it make sense to require all material to be free of quarantine pests (as defined in EU regulations) or should the Standards go further; is this feasible? Possibly the Standards should only require the participating genebanks to keep the material as free from diseases as reasonably possible and record all known infections and tests of the seed batch (if any), inform the user and support phytosanitary testing of material on request of, and paid by, the user.

It would be important to create agreement on the missing elements in the FAO Genebank Standards, listed above. All other needs for more specificity or changes will come up once a mechanism is set up in which the operating procedures of genebanks are matched with the agreed standards by experts. This exercise, which will be necessary for a certification system, will show the elements that need:

- more specificity, depending on the crop, crop group or reproductive system

- amendments, based on new scientific or practical insights.

Obviously, all these findings need to be recorded and acted upon by the certifying agency and will thus be reflected in the future versions of the Genebank Standards.

3.5 *Status quo of the European genebank community*

All above presented results were based on and verified by the survey held amongst genebanks. The responses to the survey included the largest part of recognized genebanks in Europe plus a few international genebanks, but also miss a few other important ones. The genebanks included 57 national genebanks, one regional and two international genebanks, and vary widely regarding all aspects of genebank management and thus gave a complete picture of the current situation.

The results of the survey, including a more detailed analysis, are attached in Annex 1.

It appeared that ISO9001:2015 is the standard for quality management in genebanks; a quarter of the genebank contacts indicated that they apply this standard in their genebank and others indicated they are working towards this standard. More than half of the responses indicated that standard operating procedures (SOPs) are being used, however collecting these SOPs will be difficult as most genebanks feel that the documents are for various reasons not ready for sharing, although in general they are willing to share. The SOPs are obviously written in many different languages, but it can be expected that thanks to the current translation software this will not create a problem.

It became very clear from the replies that the FAO Genebank Standards are very well known in the genebank community (91% of the respondents confirmed that they know the standards) and seen as a good starting point for genebank certification, however, as observed in the previous sections, they will need careful review and adaptation. As a result, only very few genebanks claim they comply to these standards completely.

The FAO Genebank Standards are the only standards that are widely adopted in genebanks, although some other standards were mentioned in the responses to the survey. The ECPGR Crop Specific elaborations of the FAO standards, also described in the sections above, are popular and used in several genebanks, and also ISTA rules for seed testing (ISTA 2024) were frequently mentioned. It should, in this context, be observed that though many genebanks report the use of the ISTA (or any other) standards, they generally do not follow them to the level that they would allow certification. In case of the ISTA standard for seed testing, designed for commercial seed batches, the tests are always performed on samples of at least 400 seeds. There is no genebank that uses that many seeds for its viability testing (personal observation based on many genebank visits and reviews), suggesting that a revision of this standard is necessary, also in view of the low amounts of seed obtainable from non-commercial accessions. Similarly, a careful inventory of the actual SOPs will be necessary to identify the 'standards' in use – self reporting will not suffice.

Seventy percent of the genebanks in the survey are interested in working towards certification. However, the fear for increased need for capacity/funds is commonly felt, also observing the current shortage of funds for genebank activities. The genebanks that are not interested, or reluctant, to participate in a genebank certification system, either do not see the added value or are afraid of the workload and cost associated with it. The creation of a pan-European Research Infrastructure which will share the costs and workload, is likely to ease these fears facilitating a large

The survey confirmed the expectations regarding the level of standardisation in European genebanks, although the level of current quality management was higher than expected with a quarter of surveyed genebanks being ISO9001 certified and more than half having written SOPs. This provides an excellent basis

for setting up a Genebank Certification System, although the fear of the financial and capacity requirements is widespread.

4. Summary and conclusions

Genetic resources need to be conserved for future generations and accessible for the current, to breed the new varieties needed to adapt to the ever-changing environment and farmers/consumer demands. There are various complementary approaches for conserving these genetic resources. *Ex situ* genebanking is the most prominent and most widely applied approach. The current operating genebanks are not all reliable or accessible, resulting in a rather ineffective system with low reliability and high redundancy. If genebanks could agree on the appropriate level of quality of their operations (including conservation, access and continuity), and assure this quality, this situation could be improved considerably. Therefore, a certification system for genebanks is proposed.

To determine the *status quo* regarding quality management and the adoption of, and need for, standards in genebanks, an extensive inventory was made of the situation in European genebanks.

Some genebanks have implemented quality management procedures in their operations. About a quarter of the respondents applies the quality management standard ISO9001:2015, and more than half indicated that Standard Operation Procedures (SOPs) are being used. The FAO Genebank Standards are very well known in the genebank community and seen as a good starting point for genebank certification, however, they will need careful review and adaptation. As a result, only very few genebanks claim they comply with these standards completely. The FAO Genebank Standards are the only standards that are widely known and/or adopted in genebanks, although the ISTA rules for seed testing and the ECPGR Crop Specific elaborations of the FAO standards are also popular.

A genebank certification system should thus be based on the principles of ISO9001 and use the FAO Genebank Standards. These standards however lack elements regarding access to the genetic resources in the genebank (who can access and under what conditions?) and continuity (what happens if the genebank stops?). Furthermore, some elements of the FAO Genebanks Standards will need specification (e.g. phytosanitary requirements) or generalisation (e.g. viability testing protocols).

At some stage an organisation with sufficient authority will be required that will

- verify that the SOPs of a genebank comply to the adapted FAO Genebank Standards,
- audit the genebanks to verify that the SOPs are applied (unless ISO9001 auditing is already done) , and
- do the certification.

There is a large willingness in the European genebank community to collaborate towards the goals of genebank quality improvement and certification, and there is a lot of expertise to build on. However, keeping everyone on board will require very much capacity building both in terms of knowledge and in facilities.

References

ECPGR (2011) General guidelines for regeneration, processing and storage of cucurbit species. Developed by the ECPGR Working Group on Cucurbits. European Cooperative Programme for Plant Genetic Resources, Rome, Italy. 4p.

ECPGR (2021) Plant Genetic Resources Strategy for Europe. European Cooperative Programme for Plant Genetic Resources, Rome, Italy. 72p.

ECPGR (2023a) AEGIS Crop Specific Documents, website accessed through <https://www.ecpgr.cgiar.org/aegis/documents/crop-specific-documents> August 11th 2023.

ECPGR (2023b) AEGIS Associate Member Agreements, website accessed through <https://www.ecpgr.cgiar.org/aegis/aegis-membership/associate-member-agreements> August 11th 2023.

ECPGR (2023c) AEGIS Genebank Manuals, website accessed through <https://www.ecpgr.cgiar.org/aegis/aquas/genebank-manuals> December 6th 2023.

Ellis RH, Hong TD, Roberts EH (1985). Handbook of Seed Technology for Genebanks, Vol. I: Principles and Methodology. Handbooks for Genebanks No. 2. IBPGR, Rome, Italy.

Endresen D, Gaiji S, Robertson T (2009) Darwin Core germplasm extension and deployment in the GBIF infrastructure. Page 78, in: Weitzman, A.L. (ed). Proceedings of TDWG, 2009, Montpellier, France.

Engelmann, F (2004) Plant cryopreservation: Progress and prospects. *In Vitro Cell Dev Biol - Plant* 40, 427–433.

Engels JMM, Maggioni L, van Hintum TJL (2009) Quality System for AEGIS. ECPGR report. ECPGR, Rome, Italy. https://www.ecpgr.cgiar.org/fileadmin/templates/ecpgr.org/upload/AEGIS/FOR_WEB_FINAL/QualitySystemfinal.pdf

Engels JMM, Visser L (eds) (2003) A guide to effective management of germplasm collections. IPGRI Handbooks for Genebanks no.6 IPGRI, Rome, Italy. 172p.

Engels JMM, Ebert AW, van Hintum TJL (2024) Collaboration between Private and Public Genebanks in Conserving and Using Plant Genetic Resources. *Plants* 2024, 13(2), 247.

FAO (1994) FAO/IPGRI Genebank Standards. Food and Agriculture Organization of the United Nations, Rome, International Plant Genetic Resources Institute, Rome. 17p.

FAO (2013) Genebank Standards for Plant Genetic Resources for Food and Agriculture Rome. 167p.

FAO (2022) Practical guide for the application of the Genebank Standards for Plant Genetic Resources for Food and Agriculture: Conservation of orthodox seeds in seed genebanks. Commission on Genetic Resources for Food and Agriculture. Rome. 108p.

FAO/Biodiversity (2015) FAO/Bioversity Multi-Crop Passport Descriptors V.2.1 Food and Agriculture Organization of the United Nations and Bioversity International: Rome, Italy. 11p.

Genesys (2023) Data accessed through Genesys, <https://www.genesys-pgr.org/a/overview>, August 11th 2023.

IBPGR (1983) Descriptors for Cowpea. International Board for Plant Genetic Resources Executive Secretariate, FAO, Rome. 30p.

ISTA (2024) International Rules for Seed Testing, website accessed through <https://www.seedtest.org/en/publications/international-rules-seed-testing.html> January 10th 2024.

Kotni P, van Hintum TJL, Maggioni L, Oppermann M, Weise S (2022) EURISCO update 2023: the European Search Catalogue for Plant Genetic Resources, a pillar for documentation of genebank material Nucleic Acid Research gkac852 (doi:<https://doi.org/10.1093/nar/gkac852>)

Maggioni L, Geoffriau E, Allender C, Lipman E (2014) Umbellifer crop-specific genebank standards. Appendix III in: Report of the Second Meeting of the ECPGR Working Group on Umbellifer Crops, 26-28 June 2013, St. Petersburg, Russian Federation, pp.30-32.

Rao NK, Hanson J, Dulloo ME, Ghosh K, Nowell D, Larinde M (2006) Manual of seed handling in genebanks. Handbooks for Genebanks No. 8. Bioversity International, Rome, Italy. 147p.

Sackville Hamilton, NR, Chorlton, KH (1997) Regeneration of accessions in seed collections: a decision guide. Handbooks for Genebanks No. 5. IPGRI, Rome, Italy. 75 pp.

Smith RD, Dickie JB, Linington SH, Pritchard HW, Probert RJ (2003). Seed conservation: turning science into practice. Royal Botanic Gardens, Kew, United Kingdom. 1023p.

van Hintum TJL, van Treuren R, Lievers R (2021) The conservation and use of CWR: the case for the establishment of PGR-Centres. *Crop Wild Relative* 13: 29-32

Volk GM, Bramel, P (2021). Apple Genetic Resources: Diversity and Conservation. In: Korban, S.S. (eds) The Apple Genome. *Compendium of Plant Genomes*. Springer, Cham. https://doi.org/10.1007/978-3-030-74682-7_3

Deviations

The deliverable was delayed from M11 to M13, because of the time needed for the survey in Annex 1. This had no significant impact on other activities of WP2.

ANNEX 1. Report of a survey to determine the level of quality management and the use of standards amongst European and some international genebanks

Introduction

To substantiate the ideas and claims regarding the current level of quality management and use of standards in European genebanks in Pro-Grace Deliverable 2.1, a survey was created and sent out. Many answers were received and analysed. The survey contained questions about the nature of the genebank (composition of the collection, availability of data, availability and distribution of material) and questions regarding the use of standards, quality management and the need for certification.

Survey

The survey contained the following questions:

Identification

- What is the name of the genebank, institution and if possible, the FAO institution code?
- What is the number of accessions in your genebank, and type of crops (very brief)?
- Do you upload your information to EURISCO?

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - o If yes, you be willing to share your documents?

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?
- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?
 - o If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

Standards

- Are you aware of the FAO Genebank Standards?
 - o If yes, do you think they are suitable as a basis for genebank certification?
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
- What other standards is your genebank using in terms of genebank management?

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?

Genebank Contacts

The genebank contacts were selected as follows:

- 26 'genebank contacts' from the Pro-Grace project, from a list created by asking the Pro-Grace main contacts to nominate a person that could be approached with questions regarding genebank management,
- 59 'genebank managers' from the recently established ECPGR Genebank Managers Network were added, provided they were not already on the list,
- 5 contacts from 'AEGIS Associated Members' and 2 'EURISCO National Focal Points' were added by the Secretary of ECPGR (Lorenzo Maggioni)
- 8 contacts from France were added by the ECPGR National Coordinator for France (Audrey Didier, and an additional one by Pro-Grace coordinator (Giovanni Giuliano)
- 1 final contact (Béla Bartha) of the Swiss NGO ProSpecieRara was added during a ProGrace teleconference on December 7th.

This resulted in a list with 102 genebank contacts. This list was cleaned by determining which contacts came from the same organisation – in that case one name was used as genebank contact, the others were put on the cc-list if they were considered to be able to add information. Persons that came from organisations that clearly were no genebanks (such as Euroseeds) were also taken off the list.

In the end the addressee list consisted of 61 genebank contacts, all from National genebanks except three: CIP, WorldVeg and Nordgen (all ProGrace partners). The remaining 58 originated from 36 countries, most of which were represented by one genebank, except Italy (2 genebanks), Portugal (2), Slovenia (2) Swiss (2), Spain (4), UK (6) and France with contacts from 11 genebanks.

Correspondence

Each genebank contact was approached via mail with a personalised message, plus three reminders
43 Replies were received. In some cases, the answers concerned combinations of institutions operating more or less as one genebank, so the final coverage concerned 60 genebanks. When replies were not completely clear, or questions arose during the analysis, this was clarified by additional email exchanges. A total number of 158 emails were sent and 143 received on the topic of this survey.

The list of genebanks that responded to the survey (ordered by country) is presented in the table below.

Country code	Genebank full name	Response included in this annex?
ARM	The Gene Bank of Vegetable and Industrial Crops, Armenia	yes
AUT	Group Plant Genetic Resources of AGES, Austria	yes
BEL	Walloon Agricultural Research Centre (CRA-W), Belgium	
BGR	National Genebank, Bulgaria	yes
BIH	Institute of Genetic Resources, Bosnia and Herzegovina	yes
CHE	Agroscope, Switzerland	
CHE	ProSpecieRara, Switzerland	yes
CZE	Gene Bank, Crop Research Institute, Czechia	yes
DEU	IPK Genebank Department, Germany	yes
DNK	Pometet, Denmark	yes

ESP	Genebank of the Universitat Politècnica de València COMAV, Spain	yes
ESP	Centro Nacional de Recursos Fitogenéticos, Spain	
ESP	World Olive Germplasm Bank of Córdoba (WOGBC), Spain	
EST	Genebank, Centre of Estonian Rural Research and Knowledge, Estonia	yes
FRA	Centre de ressources biologiques “Céréales à paille”, France	yes
FRA	BrACySol BRC, France	
FRA	Prunus-Juglans Biological Resource Center, France	yes
FRA	Pome fruits and roses BRC, INRAE, France	
FRA	BRC GAMÉT, France	
FRA	Centre de Ressources Biologiques Prairies, France	yes
FRA	CRB-Légumes, France	yes
FRA	BRC Carrot and other vegetable Apiaceae, France	yes
GBR	Commonwealth Potato Collection, The James Hutton Institute, UK	yes
GBR	UK National Fruit Collection, UK	yes
GBR	Germplasm Resources Unit, JIC, UK	yes
GEO	Field crop Gene bank under Scientific Research Center of Agriculture (SRCA), Georgia	
GRC	Greek Genebank, Greece	
HRV	The National Plant Genebank, Croatia	yes
HUN	National Centre for Biodiversity and Gene Conservation, Hungary	yes
IRL	Irish Gene Bank, Ireland	
ISR	Israel Gene Bank (IGB), Israel	yes
ITA	Mediterranean Germplasm Genebank, Italy	yes
LVA	LVMI “Silava”, Genetic Resource Centre, Latvia	yes
MKD	Genebank at the Institute of Agriculture, North Macedonia	yes
MNE	Montenegrin gene bank – MGB, Montenegro	yes
NLD	Centre for Genetic Resources, The Netherlands	yes
PER	CIP Genebank, Peru (International Genebank)	yes
POL	Polish Genebank, Plant Breeding and Acclimatization Institute, Poland	
PRT	Banco Português de Germoplasma Vegetal, Portugal	yes
SRB	Plant Gene Bank, Serbia	yes
SVN	Slovene Plant Gene Bank, Slovenia	yes
SWE	Nordic Genetic Resource Centre, Sweden (Regional Genebank)	yes
TWN	World Vegetable Centre, Taiwan (International Genebank)	yes

Other data sources

In parallel to approaching the genebank contacts for the survey, a complete download of the EURISCO database was made for off-line analysis of quantitative information regarding the number of accessions reported by the genebanks and included in EURISCO. Also, the ‘Genebank manuals’ as published on the AEGIS website of ECPGR were downloaded as they gave valuable insight in the organisation of some of the approached genebanks.

Analysis

Each reply was summarised and sometimes slightly re-formatted in this report. The answers provided in the responses were combined with the data from EURISCO, and sometimes additional information from other

sources, including the Genebank Manuals, the websites of the genebanks, the FAO WIEWS or the Genesys website, etc.

Results

The replies provided a wealth of information about the genebanks in Europe and those of CIP and WorldVeg. However, since the survey was not completely structured, and some respondents chose to give very long answers even if a yes/no answer was expected, the analysis was not always straight forward. For example, the simple question regarding the number of accessions in the genebank often proved complicated to answer since either the report concerned various collections with different statuses (active, base or working collection), or collections maintained in different locations of the genebank. As illustration: the Centro Nacional de Recursos Fitogenéticos manages the base collection for Spain of about 45,600 accessions but also own an active collection of 23,814 accessions. The base collection can be considered a duplicate of all other Spanish active collections. So, at the stage of streamlining the data some difficult decisions were made, but these did not affect the total picture that was created by the responses. Another illustration: the reply from the National Plant Genebank of Croatia reported on 11 genebanks in this country that are more or less managed jointly. Ten of these genebank appear separately in EURISCO.

Coverage

The 43 respondents reported on 60 genebanks. Fifty-one of these appear in EURISCO, the other 9 include the CIP and WorldVeg genebanks, but also a number of European collections – including the previously mentioned Spanish base collection. The total number of accessions covered by the survey was 1,053,491; if the CIP, WorldVeg and Spanish base collections were excluded, 925,895 accessions, managed in Europe, remained. EURISCO currently contains 1,404,464 accessions, excluding the large British *Arabidopsis* research collection (GBR140, Nottingham Arabidopsis Stock Centre, Nottingham, UK); Thus, the survey covered 66% of the EURISCO accessions.

However, often the numbers of accessions reported in the survey for many genebanks are different from those in EURISCO, being in many cases higher. The 51 genebanks included in the survey and reporting to EURISCO, reported 857,235 accessions to the survey and 623,700 to EURISCO, a difference of 233,535 accessions. These differences are either the result of old and incomplete data in EURISCO (one data set in EURISCO was uploaded in July 2008) or of policy decisions not to upload the data of parts of the collection. For instance, for France seven genebanks that appeared both in EURISCO and in the survey presented 69,186 accessions in the survey and 6,330 accessions in EURISCO, representing 9.1% of the actual conserved germplasm. This is largely due to the fact that France currently only uploads data about their selected 'National Collection'.

As mentioned above, 51 genebanks reported both to the survey and to EURISCO. EURISCO contains data of an additional 361 genebanks, but most of these are very small and might not be considered candidates for Genebank Certification, their median size being 396 accessions. However, several important and large European collections were missing in the survey (see table below). This obviously has to be taken into account when analysing the results.

Ten largest contributors to EURISCO not represented in the survey

FAO Code	Institute	#accs
GBR140	Nottingham Arabidopsis Stock Centre, Nottingham, UK	684,495
RUS001	N.I. Vavilov Research Institute of Plant Industry, St. Petersburg, Russia	200,717
GBR004	Millennium Seed Bank - Royal Botanic Gardens Kew, Ardingly, UK	86,981
UKR001	Institute of Plant Production n.a. V.Y. Yurjev of UAAS, Kharkiv, Ukraine	39,764
GBR016	Genetic Resources Unit, Aberystwyth University, Aberystwyth, UK	24,782

UKR008	Ustymivka Experimental Station of Plant Production, Ukraine	19,591
ROM007	Suceava Genebank, Suceava, Romania	18,594
ISR003	Lieberman Germplasm Bank, Tel-Aviv University, Tel-Aviv, Israel	17,059
SVK001	National Agricultural and Food Centre, Piešťany, Slovakia	15,891
TUR001	Plant Genetic Resources Department, Izmir, Turkey	12,996

Regarding availability of the material and information and actual distribution of accessions, the responses highlighted a varied situation. Some collections were completely included in the Multilateral System (MLS) of the ITPGRFA, while others not at all. Some genebanks shared all their data in EURISCO, others only small part or none at all. Some genebanks distribute a lot of materials, others hardly any, some serve mainly private individuals, others mainly breeding companies and research institutes. The causes of this variation are sometimes obvious, for example the Swiss NGO ProSpecieRara obviously serves primarily (but not exclusively) their members, whereas the Dutch CGN chooses to serve the professional user community consisting of research organisations and breeding companies. In other cases, the cause is not clear, for example, the Hungarian NBGK genebank distributes very actively, handling 3,666 requests per year on average, but distributes mainly (97%) to hobby growers and NGO's, and hardly (1%) to research institutes and breeders.

In conclusion, the responses to the survey cover the largest part of recognized European genebanks, plus a few international genebanks, but misses a few important ones. The genebanks included vary widely regarding all aspects of genebank management.

Quality management

When asked “[Do you have a formal quality management system?](#)”, 28 of the 43 respondents replied they had not, in some cases the answer was not completely clear (probably because the question was not interpreted correctly). In 11 cases from 7 countries, there was active quality management, always applying the ISO9001:2015 quality management standard. In few cases, genebank contacts indicated that they had used other quality management standards (the French NFS 96-900 or the laboratory-oriented ISO 17025) but had stopped doing so, and in some cases these or other genebanks indicated that they were working towards ISO9001:2015. Some genebanks contacts indicated that their seed laboratories applied the ISTA rules for seed testing.

When asked “[Do you have written procedures for your genebank \(Standard Operating Procedures\)?](#)” a large majority, 28 out of the 43, indicated they had, an additional 4 answered ‘partly’ or similarly, and the remaining 11 genebank contacts said they did not have any standard operating procedures (SOPs). In the last category, three genebank contacts referred to the FAO Genebank Standards, and one to their Genebank Manual. In several cases the genebank contacts that indicated that they had SOPs indicated that the SOPs did not completely describe the genebank reality since they were old, they were not completely followed, etc. – obviously these were not the ISO9001:2015 certified genebanks.

Many of the genebanks with SOPs indicated that they were in principle willing to share the text of the SOPs, however, only in a few cases it was an unconditional yes. Often language was seen as an obstacle, sometimes approval of the legal department was needed, or technical issues hindered sharing (“*I am not sure how it is technically possible since it is part of an automatic process.*”), but most frequently the genebank contact indicated that the SOPs in their current state were not ready yet or too ‘locally specific’ (“*We would need to update the documents first.*”, “*Needs updating.*”, “*They’re not confidential, but I’d be reluctant in their current format – because I think they are only of use in their local context.*”, “*These documents are adapted to our organisation. Some of them need to be revised. I am not sure that all of them are relevant for other genebanks. I think that some of them could be shared but it should be discussed internally.*”, etc.)

In conclusion, ISO9001:2015 is the main standard for quality management in genebanks, a quarter of the genebank contacts applies this standard in their genebank and others indicated they are working towards this standard. More than half of the responses indicated that SOPs are being used, however collecting these SOPs will be difficult as most genebanks feel that the documents are for various reasons not ready for sharing, although in general they are willing to share.

Genebank Standards

When asked “Are you aware of the [FAO Genebank Standards?](#)” a vast majority (38 out of 43) of the genebank contacts confirmed, including three that indicated they knew them only vaguely, only four had not heard of them. Not a single genebank contact thought that the FAO Genebank Standards were not “[suitable as a basis for genebank certification](#)”, however, some needed to consider it further (“Need to think more about it”), many indicated that they needed updates and adaptations (“Yes, but with adaptations.”, “Currently we have a new knowledge and technologies, therefore an update would be needed.”) or were even more critical (“They are good standards as objectives, but they don’t correspond to the reality of genebanks”, “They are of course a very relevant frame for guidelines, and possibly more”).

When asked “[Do you think your genebank complies to these standards; in what terms does it deviate and why?](#)” only very rarely the genebank contact confirmed compliance, usually answers corresponding to the suitability issue were given (“As far as possible, it’s not always possible”). A number of times the deviations from the FAO Genebank Standards were explained by lack of capacity/budget (“We certainly have deviation from standards due to limited resources (time, money, personnel, facility)”, “major problem lack of staff”, “Standards for safety duplication not yet covered due to lack of financial and human resources”. “We cannot regenerate all the accessions that need to be regenerated because of insufficient budget.”, etc.)

The survey showed that, apart from the FAO Genebank standards, only very few standards were applied. References were made primarily to the ECPGR Crop Specific Standards (specifications to the FAO Genebank Standards to adapt them to specific crops) and the ISTA rules for seed testing. In addition, various national or even local standards for specific aspects of genebank management were mentioned. Also references to the SMTA and various older IPGRI and FAO handbooks were made, but these cannot be considered standards. The CIP genebank contact answered “The CGIAR/GCDT Quality Management System that we follow combines components of the FAO standards, ISO 17025, Biobanks ISO, ISTA, ITPGRFA, and CGIAR policy”

In conclusion, the FAO Genebank Standards are very well known in the genebank community and seen as a good starting point for genebank certification, however, they will need careful review and adaptation. As a result, only very few genebanks claim they comply with these standards completely. The FAO Genebank Standards are the only standards that are widely adopted in genebanks, although the ISTA rules for seed testing and the ECPGR Crop Specific elaborations of the FAO standards are also popular.

Certification

“[Would your genebank be interested in working towards certification \(i.e. improve protocols to meet standards that we agree on and be open to external auditing\)? \(This involves a commitment of your organisation and will come with extensive capacity building and other support to get there\)](#)” This was the question and was answered with a clear yes in 30 responses (70%). In four cases the answer was no, and in nine answers there was doubt (“we wonder whether certification is necessary, maybe guidelines would be sufficient” and “Formal certification might be too time consuming for our management”) or other reasons for reluctance (“not necessary since we are already certified”). The genebank contacts that answered ‘no’ included the Swiss NGO (“No, our focus is on in-situ conservation, for which we offer our main contributions

within Pro Grace. Of course, our gene bank builds an important backup and it's the linchpin for our services.”), two French genebanks (“What benefits could be obtained from such certification? We already have ISO 9001 certification, which we obtained recently. For now, I do not think that we have financial and human resources to commit to another certification process. Maybe later, depending on the advantages that could be obtained.”), “I am not willing to commit to this as 1/ I am not an expert , 2/ we just got the ISO9001 certification, 3/ we recently spent a lot of time on certification (43 internal meetings in 2023 alone) and we need to move to other aspects (even if certification is only the start, not the end). However, as mentioned in the beginning, I think useful to have some standard protocols, procedures etc... for genebanks, that people can adapt to their practice. So I am ok to share experience if of some interest but no investment on a regular basis.”), and a Danish genebank contact (“We do not have enough staff/money or time. We use our time to keep the collections in good shape, and cleaning up mistakes and other things. Trying to use the genebank in the research and project, so it will be used.”). But also amongst most of the others there was a reluctance because of the fear of the increased workload and/or the lack of capacity to meet the required quality level of the operations (“At present, we do not have enough budget and personnel to comply with a certification system.”, and various variation of this statement such as “It is all depend on our budget abilities to hold these standards.” and “Afraid of the work-load”).

Apart from this need for justification for creating a certification system, and the generally felt fear of the workload and required capacity and funds, many other remarks were made when the genebank contacts who were open for a certification system were asked “[what support would you need?](#)”. In general, it consisted of two recurring elements: support in developing the protocols and the quality management system, and support in implementing the protocols in terms of funds for staff and equipment. On top of that the need for capacity building and more collaboration was expressed frequently.

Some answers also gave constructive observations and suggestions such as “A defined accreditation standard would be essential so that organisations had clear rules / structures to follow.”, “It would be useful to consult with institutions that have obtained certification in order to plan the specific measures to be implemented.”, “Sharing of SOPs”, and from a longer but very valuable elaboration of the WorldVeg genebank contact: “To avoid is the establishment of parallel systems of implementing genebank standards e.g. (PROGRACE, Crop Trust, and FAO), I believe there should be alignment between PROGRACE, the efforts of the Global Crop Diversity Trust to implement genebank quality management systems in national and international genebanks, and with the FAO. Even if the systems are slightly different, they should be able to connected... there should be sufficient flexibility in standardization –several options- to implement genebank quality management systems with available resources. For instance, seed health testing procedures can be implemented at the front-end (before storage) or at the back-end (before distribution or regeneration), which has its pros and cons ... So a standardization system would consist of different levels: i) general standards; ii) specific standards for crops developed by working groups; iii) peer-review system that underpins the practical implementation of standards”.

In conclusion, seventy per cent of the genebanks are interested in working towards certification. However, the fear of increased need for capacity/funds is commonly felt, also observing the current shortage of funds for genebank activities. The genebanks not interested, or very reluctant, in participating in a genebank certification system either do not see the added value or are afraid of the workload and cost associated with it.

Selected responses received in the survey

ARM The Gene Bank of Vegetable and Industrial Crops, Armenia

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
The Gene Bank of Vegetable and Industrial Crop. Scientific Centre of Vegetable and Industrial crops of the Ministry of Economy of RA. WIEWS code: ARM008
- What is number of accessions in your genebank, and type of crops (very brief)?
We manage about 3900 accessions of indigenous and modern varieties, promising lines, hybrids of vegetable and industrial crops, and aromatic plants. The main crops include tomato, pepper, eggplant, cucumber, pumpkin, melon, watermelon, vegetable marrow, summer squash, bean, tobacco, soybean, chickpea, cabbage, okra, bottle gourd, loofah, physalis, flax, quinoa, lettuce, mash, basil, beebalm, mentha, and some other spicy aromatic plants
- Do you upload your information to EURISCO?
Yes, as a rule, the national inventory is updated twice per year.

Quality management

- Do you have a formal quality management system?
No, we do not have a formal quality management system
 - o If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)?
Although we follow FAO gene bank standards, we do not have our own written procedures for gene bank management
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - o If yes, you be willing to share your documents?

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
Yes
 - o If yes, what part?
There are currently 499 MLS accessions recorded in EURISCO, and this number will increase by about 50 accessions in the next update.
- Do you have a written policy regarding distribution of genebank accessions?
No
 - o If yes, could you send it (we can translate it from your language into English)?
 - o If no, could you briefly describe your distribution policy?
Our only strategy is the strategy of establishment of seed collections for vegetable and industrial crops, which envisages formation of two main collections - base (long-term) and active (medium-term) and defines criteria for inclusion of accessions in base and active collections.
- How many samples did you distribute in the period 2018-2022?
About 50 samples, but only on national level
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
All requests concern only released varieties, with no interest in breeding lines or other research material. The majority of requested germplasm (about 80%) is in tomato, cucumber, eggplant, and soybean, while the rest is in aromatic plants. Approximately 80% of requests come from farmers, and the remaining 20% come from research institutions.

Standards

- Are you aware of the FAO Genebank Standards?
Yes, we are aware of the FAO Genebank Standards and strive to adhere to the main procedures.

- If yes, do you think they are suitable as a basis for genebank certification?
- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

While most of the standards are met, there are some deviations, notably:

- Software for gene bank management does not exist
- Passport data for all accessions are registered, but characterization and evaluation data are available for a very limited number of accessions
- What other standards is your genebank using in terms of genebank management?
No other standard is used

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
In general, we are interested in working towards certification to improve gene bank management and develop protocols.
 - If yes, what support would you need?
There is a need for technical consultancy in developing protocols and support in obtaining missing equipment, if appropriate, as well as certification by the relevant body." Financial support in getting missing equipment if appropriate and certification by relevant body
 - If no, why not?
Our concern lies in the existence of a national/regional Certification Body and the financial implications that may arise during the certification process.

AUT Group Plant Genetic Resources of AGES, Austria

... we are in an evaluation process of our system and we would absolutely benefit from such sharing platforms and certification system blueprints.

I answered your questions to the best of my knowledge

...

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

AGES - Austrian Agency for Health and Food Safety, Group Plant Genetic Resources, Department for Seed and Propagating Material, Institute for Seed and Propagating Material, Phytosanitary Service and Apiculture, Division for Food Security

AUT001

- What is number of accessions in your genebank, and type of crops (very brief)?

There are now around 5,400 accessions stored in our genebank (www.genbank.at)

Mainly cultivated plants (4456 accessions/specimens of 164 species) are preserved; including 1,482 wheat samples, 1,005 barley, 449 oats, 89 rye, 57 corn, 140 runner beans, 510 kidney beans, 95 peas, 60 field beans, 78 soybeans and 169 poppy samples. In addition, the AGES genebank in Linz also has a large collection of medicinal and aromatic plants, as well as endangered species (in collaboration with the state of Upper Austria). Here we preserve 780 medicinal and aromatic plants and 163 samples of endangered plants, out of a total of 458 species.

- Do you upload your information to EURISCO? YES

Quality management

- Do you have a formal quality management system? NO

- If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)? YES
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)? 29 forms/lists, 5 testing regulations, 5 standard operating instructions and 4 standard operating procedures
 - If yes, you be willing to share your documents? We would need to update the documents first. They are available in German only.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? YES
 - If yes, what part?
- Do you have a written policy regarding distribution of genebank accessions? YES
 - If yes, could you send it (we can translate it from your language into English)?
 - If no, could you briefly describe your distribution policy? We distribute any material with an SMTA
- How many samples did you distribute in the period 2018-2022? ~70 <001, sent on request>
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.? Could send document about Material exchange <002, sent on request>

Standards

- Are you aware of the FAO Genebank Standards? YES
 - If yes, do you think they are suitable as a basis for genebank certification? Should be updated
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? As far as possible, its not always possible to regenerate or sample 60 plants, we often have far less viability than 85%,...
- What other standards is your genebank using in terms of genebank management?

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there) YES
 - If yes, what support would you need? templates
 - If no, why not?

BGR National Genebank, Bulgaria

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
National genebank of Bulgaria, Institute of Plant Genetic Resources "Konstantin Malkov"-Sadovo, FAO institute code: BGR001
- What is number of accessions in your genebank, and type of crops (very brief)?
Number of accessions in Bulgarian genebank: base collection -44875, exchange collection-2985; working collections- 9122
- type of crops- cereals, legumes, forage grasses, vegetable crops, industrial and oil crops, medicinal plants, ornamental plants
- Do you upload your information to EURISCO?

Yes. At the end of each year, the information in EURISCO is updated from our National Focal Point.

Quality management

- Do you have a formal quality management system?

No.

- If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)?
No. Only Operational genebank manual of National genebank of Bulgaria published in AEGIS (<https://www.ecpgr.cgiar.org/aegis/aquas/genebank-manuals>).
- If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
- If yes, you be willing to share your documents?

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

Yes.

- If yes, what part?

All accessions from the exchange collection are free for exchange.

- Do you have a written policy regarding distribution of genebank accessions?

No.

- If yes, could you send it (we can translate it from your language into English)?
- If no, could you briefly describe your distribution policy?

SMTA has been implemented since 2010. All accessions including non-annex 1 cops are provided under the SMTA regulations. Seed materials are distributed for research purposes only after signing the SMTA. In case of distribution of varieties, created and maintained by IPGR-Sadovo, for referent collections no SMTA is needed. In that case the blank form, sent by the organization requiring the seed material is followed. For scientific organizations in country and EU, the period for processing and sending the requested seeds is about 1 week. For countries outside the European Union, it is necessary to obtain consent from the Agricultural Academy and to obtain a phytosanitary certificate from the Bulgarian Food Safety Agency (BFSA), therefore the processing and dispatch period is up to 4 weeks.

- How many samples did you distribute in the period 2018-2022?

Total number of distributed samples in the period 2018-2022 is 3206.

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

Year	Number of accessions sent abroad	Number of accessions sent at home	Total number of accessions	% Samples sent abroad	% Samples sent at home	Total number of requests	Number of completed requests		
							Number of completed requests from abroad	Number of request from abroad	Total
2018	123	111	234	52.56	47.44	15	6	5	11
2019	221	6	227	97.36	2.64	15	10	1	11
2020	241	31	272	88.60	11.40	27	18	3	21
2021	1511	198	1709	88.41	11.59	19	7	6	13
2022	558	26	584	95.55	4.45	12	4	2	6
Total	2654	372	3026	87.71	12.29	88	45	17	62

*The reference does not include information on the number of samples provided to curators by the PGR program for their inclusion in scientific research programs and projects. 99% of the users are research institutes

Standards

- Are you aware of the FAO Genebank Standards?

Yes, generally conforming to the FAO Genebank Standards.

- If yes, do you think they are suitable as a basis for genebank certification?

Yes.

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Standards for safety duplication not yet covered due to lack of financial and human resources (only 6.44% of the stored specimens from the base collection have a safety duplicate).

What other standards is your genebank using in terms of genebank management?

CROP-SPECIFIC GENE BANK STANDARDS (<https://www.ecpgr.cgiar.org/aegis/aquas/genebank-standards>)
ISTA

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there) - YES
- If yes, what support would you need? – We need capacity building support and financial support for new equipment, covering the standards for certification. We need help in developing Standard Operating Procedures.

BIH Institute of Genetic Resources, Bosnia and Herzegovina

...

Here you have answers from one gene bank, Institute of Genetic Resources, it serves as a gene bank of the Republic of Srpska (one entity of BiH).

...

Identification

What is the name of the genebank, institution and if possible the FAO institution code?

Institute of genetic resources, University of Banja Luka

BIH039

What is number of accessions in your genebank, and type of crops (very brief)?

1262 accessions in the seed collections (field crops, vegetable crops, fodder crops, medicinal and aromatic crops, industrial crops...)

Do you upload your information to EURISCO?

yes

Quality management

Do you have a formal quality management system?

If yes, what? (ISO 9001 or another?)

No

Do you have written procedures for your genebank (Standard Operating Procedures)?

yes

If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

Rules on procedures in the seed gene bank of Republic of Srpska are adopted

If yes, you be willing to share your documents?

yes

Distribution

Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

If yes, what part?

No

Do you have a written policy regarding distribution of genebank accessions?

yes

If yes, could you send it (we can translate it from your language into English)?

yes

If no, could you briefly describe your distribution policy?

How many samples did you distribute in the period 2018-2022?

Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

<see follow-up>

Standards

Are you aware of the FAO Genebank Standards?

yes

If yes, do you think they are suitable as a basis for genebank certification?

yes

If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Yes, the Rules on procedures in the seed gene bank are established in accordance to FAO Genebank Standards

What other standards is your genebank using in terms of genebank management?

Future

Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

If yes, what support would you need?

Yes, expert and financial if possible

If no, why not?

<follow-up, after asking about details on availability and distribution>

... there was no distribution of material in that time... except for the Svalbard store. Although BIH is not a signatory party of ITPGRFA, we decided to use SMTA for distribution.. we are trying to solve this issue legally...

Attached guideline for gene bank procedure in Serbian, it should be also translated in English, I will check.

<019>

CHE ProSpecieRara, Switzerland

...

Of course we do act like a gene bank in some ways but as our activities are tightly connected with on farm conservation within our seed savers network, we can't fulfil the quality standards or it is better to say it doesn't make sense to fulfil all the standards in our context.

...

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Name of the institution: ProSpecieRara
FAO Institution Code INSTCODE: CHE063
- What is number of accessions in your genebank, and type of crops (very brief)?
Alles oder nur samenvermehrbar? Hier die samenvermehrbar:
1'293 varieties (landraces, obsolete varieties) of vegetables (some of them are different but not yet defined whether it is a landrace or obsolete variety).
194 varieties (landraces, obsolete varieties) of field crops (some of them are different but not yet defined whether it is a landrace or obsolete variety).
167 herbs
1067 varieties (most of them obsolete varieties) of ornamental plants
3237 fruit varieties
565 berry varieties (some of them are different but not yet defined)
167 vine-varieties (some of them are different but not yet defined)
Total 6'690
- Do you upload your information to EURISCO?
The data for EURISCO is actually updated for all NAP (CH-national action plan on pgrfa) -relevant accessions via the National Focal Point (formerly Beate Schierscher, now Christian Eigenmann from the FOAG). However, this has not happened since the changeover to the new NIS (Swiss National Information System). As far as I know, ProSpecieRara has not yet fed any additional data from non-NAP accessions into EURISCO. The practice should be discussed. But this has to be coordinated by the National Focal Point.

Quality management

- Do you have a formal quality management system? no
 - If yes, what? (ISO 9001 or another?)
 -
- Do you have written procedures for your genebank (Standard Operating Procedures)? yes
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
About 10
 - If yes, you be willing to share your documents?
Yes, but we have not a single document but different forms of instructions. Would be needed to be brought into shape before sharing.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?
We have so far not officially notified our whole collection. But as breeders could have access to our (whole) collection with the SMTA from the MLS – we see our collection as being a part of the ITPGRFA MLS. As ProSpecieRara is involved in the National action plan

for PGRFA in Switzerland all the accession that are conserved and evaluated with national funds have to become a part of the MLS.

- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?
 - If no, could you briefly describe your distribution policy?
- For research and breeding, as well as for conservation purposes (exchange with other genebanks), ProSpecieRara endeavours to keep access open and simple. Breeders and researchers in the field of food and agriculture will be granted access under a standard material transfer agreement (sMTA). This agreement was introduced as part of the International Treaty on Plant Genetic Resources for Food and Agriculture. For that we use a simple click and wrap system for every order that has been effected through our online variety-finder.

☐ Ich bestätige hiermit, dass ich die bestellte ProSpecieRara-Sorte weder für gewerbliche Zwecke noch für die Züchtung oder/und zu Forschungszwecken verwende oder zu diesen Zwecken an Dritte weitergebe. *

Mehr Infos

If you are a researcher or breeder you must contact us directly and sign the sMTA.

- For research and utilisation in other areas (e.g. for cosmetics or medicines), as well as for crops that are not intended for food (ornamental plants), a different contract applies, which we will draw up together with the user on a case-by-case basis.
- Otherwise, we see the usage of the genetic resources in our collection as free for production and similar uses (like growing by hobby gardeners) and no SMTA is required for access by these users.

<see follow-up discussion below>

- How many samples did you distribute in the period 2018-2022?
15'225
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
 about 80% seed savers
 about 12% producers and market drivers (seedlings for gardeners)
 about 5% professional vegetable producers
 about 2% to users abroad
 less than 1% to breeders, genebanks and other research institutions

Standards

- Are you aware of the FAO Genebank Standards?
 - If yes, do you think they are suitable as a basis for genebank certification?
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
- What other standards is your genebank using in terms of genebank management?

➔ Yes we are aware of the CGIAR standards but in Switzerland many years ago we developed conservation strategies for every crop-species that included conservation procedures. In addition our genebank managers visited and followed different courses in Wageningen and other meetings to improve our quality management, but our genebank is mainly a backup for

our seed savers network that is managing the pgr of ProSpecieRara on farm. That's why it is a continuous in and out of samples.

- ➔ The role of our "genebank" is specific and tightly connected to the on farm management system. We are not aware of certification systems that are experienced with our on farm management system, but if it would be of any interest to develop such a certification system as a best practice standard in the future we would be happy to share our experiences.
- ➔ Every sample that enters the genebank is registered and every sample that leaves the the genebank is registered as well. We can trace back every lot that has left the gene bank more than 10 years back.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
 - If no, why not?

No, our focus is on in-situ conversation, for which we offer our main contributions within Pro Grace. Of course, our gene bank builds an important backup and it's the linchpin for our services.

See our answers above.
- ➔ We have an additional backup system with our national genebank (blackbox-system). Some of our accessions are stored in Svalbard as well as a part of the national collection.
- ➔ As we are propagating seeds for the national Swiss Gene Bank in Nyon, we are aware of certification standards.

<follow up discussion>

Sorry but I was surprised of the high number of registered records in EURISCO. Sorry but my table was not clear. So I learned from my colleagues that the records they indicated were all different varieties that are labeled by ProSpecieRara but we have many more in our collection. So I had to change the numbers – very sorry for that!

That there is still a different between our number of records and EURISCO is due to two facts: first the data are already five years old and second our national database – that is the base for the EURISCO records – enters **multiplicands** and not varieties or accessions.

A few remaining observations and questions:

- Regarding EURISCO, it now contains 7128 records from CHE063 (of which 6383 in the MLS). In your answers you report to have 5052 accessions ...
- The text you copied ("weder für gewerbliche Zwecke noch für Züchtung") implies that the user is not allowed to use it in breeding – I'm probably misinterpreting it. What I understand is that all material is available under SMTA for any user, provided the use is for food and agriculture (direct use requires no SMTA). Is that correct?

Yes this is absolutely correct.

- Do you charge money for requests distributed under SMTA?

No.

- What are seed savers – are they your members who grow it for producing more seeds? It would be strange if you distribute 80% for the sake of maintenance. Could you elaborate?

Seed savers are propagating seeds for us and forwarding seeds to private people that are members of our network as well. Some partners like museums or botanical gardens have big public gardens with many

varieties (up to 200 varieties = public demonstration gardens) and we provide the seeds for them every year and every seed-lot we distribute is recorded.

CZE Gene Bank, Crop Research Institute (CRI), Czech Republic

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Gene Bank, Crop Research Institute, CZE122
- What is number of accessions in your genebank, and type of crops (very brief)?
57 158 accessions in 2023

Aromatic and medicinal plants
Beta and other seed root crops
Cereals
Flowers
Rhododendron, Rosa
Fruit woody plants
Grasses
Vegetables
Food legumes
Miscellaneous, spec. of flowering meadows
Oil plants
Potatoes
Fodder plants
Grape
Ornamental woody plants (leafy)
Industrial plants
Zea and alternative cereals

- Do you upload your information to EURISCO? Yes, periodically.

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)
Yes, the ISO quality management system in accordance with ČSN EN ISO 9001:2016 for the activities of the seed gene bank was introduced in September 2011. All detailed descriptions of activities and related documents are available on the genebank local intranet (in Czech) and for external users it is available on request.
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
Procedures are described in documents within the ISO 9001 quality management system and in the Operational genebank manual of the Crop Research Institute within ECPGR
 - o If yes, you be willing to share your documents?
Operational genebank manual of the Crop Research Institute in available on ECPGR website

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

- If yes, what part? Yes, all accessions included in the National Programme are included in the MLS and provided only on the basis of the SMTA, regardless of Annex I.
- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?
It is described in the Operational genebank manual of the Crop Research Institute (AQUAS ECPGR)
 - If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
13900 samples from the Genebank
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
636 requests; 63% requests from abroad
53% research
16% breeding
18% sent to curators for regeneration
13% other (education, exposition, germination, etc)

Standards

- Are you aware of the FAO Genebank Standards?
 - If yes, do you think they are suitable as a basis for genebank certification?
Yes
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
The GB standards were published in 2014. Currently we have a new knowledge and technologies, therefore an update would be needed. Some thresholds can be updated and presented in intervals, because genebanks operate in diverse conditions or not able to reach the thresholds. There is missing a chapter about molecular data, markers of breeding useful characters, that should be considered.
- What other standards is your genebank using in terms of genebank management?
ISO 9001:2016

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
 - If no, why not?
We think we are OK 😊, but we are willing to collaborate in a possible newly designed certification system or help with certification of others

More information you can find on

https://www.ecpgr.cgiar.org/fileadmin/templates/ecpgr.org/upload/AEGIS/Documents/Procedures_examples/Genebank_manuals/CRI_Operational_genebank_manual_ed_2022.pdf

DEU IPK Genebank Department, Germany

Identification

- *What is the name of the genebank, institution and if possible the FAO institution code?*
Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Genebank Department
DEU146 (Gatersleben, main site), DEU159 (Groß Lüsewitz, potato collection), DEU271 (Malchow, oil and forage crops)

- *What is number of accessions in your genebank, and type of crops (very brief)?*
151,000 accs.; crops from the temperate region and their wild relatives (750 genera, 3000 species)
- *Do you upload your information to EURISCO?*
Maybe 😊

Quality management

- *Do you have a formal quality management system?*
Yes
 - *If yes, what? (ISO 9001 or another?)*
ISO 9001
- *Do you have written procedures for your genebank (Standard Operating Procedures)?*
Yes
 - *If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?*
Approx. 75 + supporting processes
 - *If yes, you be willing to share your documents?*
No

Distribution

- *Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?*
Yes
 - *If yes, what part?*
More or less all Annex 1 crops (approx. 114,000 accs.)
- *Do you have a written policy regarding distribution of genebank accessions?*
Yes
 - *If yes, could you send it (we can translate it from your language into English)?*
No, needs clarification from the legal department
 - *If no, could you briefly describe your distribution policy?*
We distribute to everybody worldwide
- *How many samples did you distribute in the period 2018-2022?*
See statistics file <003>
- *Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?*
See statistics file

Standards

- *Are you aware of the FAO Genebank Standards?*
Yes
 - *If yes, do you think they are suitable as a basis for genebank certification?*
Yes, in principle. High-level standard which will be hard to fulfil for some genebanks

- *If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?*

Yes

- *What other standards is your genebank using in terms of genebank management?*

Own standards based on quality management system

Future

- *Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)*

Not necessary since we are already certified

- *If yes, what support would you need?*
- *If no, why not*

DNK Pometet, Denmark

Identification

- *What is the name of the genebank, institution and if possible the FAO institution code?*
Pometet, Department of Plant- and Environmental Sciences. University of Copenhagen
- *What is number of accessions in your genebank, and type of crops (very brief)?*
Apples 800, Plums 130, Pears 130, Cherry 80, Wine 60, Gooseberry 130, Currants 80, Elders 80, Quince 20, Nuts 80, Strawberrys 150, Raspberry 20.
- *Do you upload your information to EURISCO? Not yet but will true Nordgen.*

Quality management

- *Do you have a formal quality management system?*
 - *If yes, what? (ISO 9001 or another?)* No
- *Do you have written procedures for your genebank (Standard Operating Procedures)?* Yes a few
 - *If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?* About procedures in the lists. When they are updated every year.
 - *If yes, you be willing to share your documents?* Yes

Distribution

- *Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?*
 - *If yes, what part?* No
- *Do you have a written policy regarding distribution of genebank accessions?*
 - *If yes, could you send it (we can translate it from your language into English)?* Yes, they are on our website www.pometet.dk/ydelser/podekviste/
 - *If no, could you briefly describe your distribution policy?*
- *How many samples did you distribute in the period 2018-2022?* About 685.
- *Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?* 2% abroad. 68% private. 30 % Professionals. Are my presumption.

Standards

- *Are you aware of the FAO Genebank Standards?* Yes and they have been used.
 - *If yes, do you think they are suitable as a basis for genebank certification?*

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? I think they are up for a new look because of shifting staff, so the work are more routine based.
- What other standards is your genebank using in terms of genebank management? We have some standards from a project for about 10 years ago, and they was made so they could be used together with Nordgen and the program SESTO. Now we are shifting over from SESTO to the Grin Global program GENBIS.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
 - If no, why not? No not at this moment, we do not have enough staff/money or time. We use our time on keeping the collections in good shape, and cleaning up mistakes and other things. Trying to use the genebank in the research and project, so it will be used.

ESP Genebank of the Universitat Politècnica de València (COMAV), Spain

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

Name of the genebank: Genebank of the Universitat Politècnica de València

Institution: Universitat Politècnica de València

FAO code: ESP026

- What is number of accessions in your genebank, and type of crops (very brief)?

The number of accessions of vegetable crops is about 12,000. The most important crops are tomato (with more than 3,000 accessions), pepper and melon with more than 1,000 accessions, lettuce, Cucurbita and beans with more than 500, followed by Brassica crops, onion and leek, eggplant, watermelon, tomato wild relatives, cucumber, pepper wild relatives, etc. with more than 200 accessions.

- Do you upload your information to EURISCO?

Our information is uploaded to EURISCO by the Spanish National Coordinator, National Center of Genetic Resources, Alcalá de Henares, Madrid

Quality management

- Do you have a formal quality management system?

No

- If yes, what? (ISO 9001 or another?)

- Do you have written procedures for your genebank (Standard Operating Procedures)?

Yes

- If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

-We have the Operational genebank manual for the COMAV Genebank, as well as the AEGIS Operational Genebank Manual

-Agro-morphological descriptors for Beta, eggplant, turnip and kohlrabi, cabbage, cawliflower, Cucurbita, Capsicum, onion, spinach, bean, pea, melon, lettuce, leek, cucumber, Raphanus, watermelon, tomato and carrot.

-Regeneration protocols for Brassica, Solanaceous and Cucurbits crops and for lettuce.

- If yes, you be willing to share your documents?

Yes

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

Yes

- If yes, what part?

The whole collection

- Do you have a written policy regarding distribution of genebank accessions?

No

- If yes, could you send it (we can translate it from your language into English)?
- If no, could you briefly describe your distribution policy?

Accessions are distributed by signing the Standard Material Transfer Agreement to farmers, researchers and seed companies. The fees for the distribution of seeds are published in the Budget of the UPV available at the webpage of the Universitat Politècnica de Valencia

- How many samples did you distribute in the period 2018-2022?

10,418

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
-

Table 1. Number of requests delivered per country of destination and type of requester.

Continent	Country	Seed companies, cooperatives	Public research centers	Genebanks and conservacionists	Education	Rural development, agrarian organizations	Farmers, self consumption	Vegetal Certification Office (Control for tests)	Total
Africa	Egypt	0	1	0	0	0			1
America	Argentina	0	1	0	0	0			1
America	Bolivia	0	1	0	0	0			1
America	Canada	0	4	0	0	0			4
America	United States	0	2	0	0	0			2
Asia	China	1	0	0	0	0			1
Asia	Corea Sur	0	1	0	0	0			1
Europe	Germany	0	0	1	0	0			1
Europe	Bulgaria	0	3	0	0	0			3
Europe	Spain	32	242	15	6	4	93	2	394
Europe	France	2	10	0	0	0			12
Europe	Italy	1	10	1	0	0			12
Europe	The Netherlands	13	1	0	0	0			14
Europe	Portugal	0	1	0	0	0			1
TOTAL		49	277	17	6	4	93	2	448

Table 2. Number of accessions delivered per country of destination and type of requester.

Continent	Country	Seed companies, cooperatives	Public research centers	Genebanks and conservacionists	Education	Rural development, agrarian organizations	Farmers, self consumption	Vegetal Certification Office (Control for tests)	Total
Africa	Egypt	0	20	0	0	0			20
America	Argentina	0	19	0	0	0			19
America	Bolivia	0	2	0	0	0			2
America	Canada	0	165	0	0	0			165
America	United States	0	8	0	0	0			8
Asia	China	2	0	0	0	0			2
Asia	Corea Sur	0	2	0	0	0			2
Europe	Germany	0	0	1	0	0			1
Europe	Bulgaria	0	140	0	0	0			140
Europe	Spain	236	5103	87	33	13	515	10	5997
Europe	France	49	358	0	0	0			407
Europe	Italy	5	669	5	0	0			679
Europe	The Netherlands	2813	158	0	0	0			2971
Europe	Portugal	0	5	0	0	0			5
TOTAL		3105	6649	93	33	13	515	10	10418

Table 3. Number of accessions delivered per crop and type of requester.

	Seed companies, cooperatives	Public research centers	Genebanks and conservacionists	Education	Rural development, agrarian organizations	Farmers, self consumption	Vegetal Certification Office (Control for tests)	Total per crop
Tomato	936	3806	21	5	7	236	9	5020
Pepper (C. annum)	1623	459	4	3	1	41		2131
Tomato (WR)	109	951	0	0	0	18		1078
Pepper (<i>Capsicum</i> sp)	245	310	0	0	1	7		563
Melon	77	292	16	0	2	36	1	424
Cucurbita sp	17	133	6	1	0	17		174
Brassica	5	111	2	4	0	13		135
Lettuce	35	58	8	5	1	21		128
Cucumber	11	96	2	1	0	13		123
Watermelon	9	96	1	0	0	11		117
Eggplant	1	70	6	2	0	27		106
Beans	8	51	4	0	0	15		78
Others	29	216	23	12	1	60	0	341
TOTAL	3105	6649	93	33	13	515	10	10418

Standards

- Are you aware of the FAO Genebank Standards?

Yes

- o If yes, do you think they are suitable as a basis for genebank certification?

Yes

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Our genebank deviates in several aspects related to regeneration of accessions. We can not regenerate all the accessions that need to be regenerated for insufficient budget. Also, the information available on line is incomplete, lacking characterization data and images.

- What other standards is your genebank using in terms of genebank management?

Engels JMM, Visser L (eds) (2003) A guide to effective management of germplasm collections. IPGRI Handbooks for Genebanks no.6 IPGRI, Rome, Italy. 172p.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

Yes

- If yes, what support would you need?

Sufficient stable funding for the genebank. At present we do not have enough budget and personnel to comply with a certification system.

- If no, why not?

ESP World Olive Germplasm Bank of Córdoba (WOGBC), Spain

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
-World Olive Germplasm Bank of Córdoba (WOGBC). Centre "Alameda del Obispo. Andalusian Institute for Research and Training in Agriculture, Fishery, Food and Organic Production (IFAPA).

-FAO Code: ESP046

- What is number of accessions in your genebank, and type of crops (very brief)?

1246 accessions that belongs to around 720 olive cultivars.

- Do you upload your information to EURISCO?

Yes we do it through the Centre of Plant genetic Resources Network (CRF) of INIA-CSIC

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?)
No
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
Yes, we have procedures of identification by means of morphological and DNA markers, agronomical and fruit trait evaluations
 - If yes, you be willing to share your documents?

-Most of them are shared by the Network of IOC (International Olive Council) germplasm Collection so yes.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?
No
- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?
 - If no, could you briefly describe your distribution policy?
We distribute plant material that is only related to scientific activities and that cannot be used for commercial purposes. IFAPA is working with the Ministry of Agriculture to follow a common policy as far the plant distribution. Up to know the distribution of the plant material (plants and/or olive shoots from WOGBC cultivars) has been based on either the general FAO-MTA or IFAPA agreements (Spanish municipalities or plant material abroad). While the requests from IFAPA and /or other scientific Institution from Spain are performed by e.mail. The receptor of the plant material fill out a short questionnaire explaining the purpose of the use of the material and after that we either sent and/or propagate it for them.
- How many samples did you distribute in the period 2018-2022?
 - 4605 plants that belonged to 427 different cultivars, 100 shoot samples, 900 fruit samples
 - Rooted plant material for scientific studies on Xylella fastidiosa resistance: 307 cv, 15 plants per cultivar
 - Rooted plant material for participatory on farm conservation: 120 cv, 2 plants per cultivar
 - Plant material for DNA studies: 100 shoot samples
 - 900 Fruit samples for phenolic compositions: 1 kg fruit per each tree, 100 cv x 3 trees x 3 years
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
 - Around 60% of the plant material was sent in Italy, The user categories are: Scientific institutions: 97%, 3% agricultural organisations and/or municipalities.

Standards

- Are you aware of the FAO Genebank Standards?
 - Yes
 - If yes, do you think they are suitable as a basis for genebank certification?
-Need to think more about it

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Our gene bank complies to most of the FAO standards for ex situ genebank but I have not done a direct comparison one by one....

- What other standards is your genebank using in terms of genebank management?

-Standards of Spanish Network of Germplasm Collections (CRF-INIA-CSIC)

- IOC (international Olive Council) standards for the Network of olive germplasm collection

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?

We are discussing with our Institution about these issues

- If no, why not?

<follow-up after asking “You say about the distributed material: Around 60% of the plant material was sent in Italy – You are located in Spain, why 60% to Italy?”>

Because in Italy they have the new disease caused by the bacteria *Xylella fastidiosa* and we sent there cultivars from all Mediterranean countries to study their resistance/tolerance to this new disease.

We are doing the same in Mallorca (Balearic island) where we have the same disease but a less virulent strain.

In addition to ... our collaboration with Italian research colleagues from South Italy (where *Xylella fastidiosa* has caused huge damages), I just wanted to add that part from having plant material/cvs from 29 different countries, an added value of our WOGBC collection is that all our cultivars are correctly identified at tree by tree basic. And in olive there are still many identification issues to be resolved...

EST Genebank, Centre of Estonian Rural Research and Knowledge, Estonia

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Genebank
Centre of Estonian Rural Research and Knowledge
EST 019
- What is number of accessions in your genebank, and type of crops (very brief)?
3100 accessions of 66 species
Seed collection: cereals, forage grasses and legumes, oil crops, vegetables.
In vitro collection: potato
- Do you upload your information to EURISCO?
Yes
Last upload 29.11.2023

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?)
No
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
Yes.
Document on basic procedures that includes collecting, packing, documentation, germination tests, distribution and safety duplication. For in vitro collection: internal lab procedures.
 - If yes, you be willing to share your documents?
Yes, but these are in Estonian.
In English *Genebank manual* compiled for the ECPGR AEGIS in 2017 is available. Needs updating.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?
All Annex I accessions, i.e. 92% of accessions.
All material is distributed with the SMTA.
- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?
It states: Genebank handles orders as fast as possible, maximal within a week. Amount for distribution is 50-200 seeds per accession depending on the species and purpose. For in vitro accessions we deliver 3-6 plants per accession.
 - If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
826 samples
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
56% sent abroad
User categories: research institutions, universities, private and public breeders, seed savers organisations, nature/agricultural museums

Standards

- Are you aware of the FAO Genebank Standards?
 - If yes, do you think they are suitable as a basis for genebank certification?
Yes.
Yes, but in some parts with more detailed additions.
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
In general yes, with some weak points: phytosanitary procedures, more comprehensive protocols and systematic maintenance of information. Also, safety duplication for in vitro material is missing.
- What other standards is your genebank using in terms of genebank management?

-

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
We could work towards improving protocols and some capacity building (as new staff is foreseen in the coming years), but not (yet) certification.
 - If no, why not?

FRA Centre de ressources biologiques “Céréales à paille”, France

...

we currently do not have the man power to maintain in a good shape our quality system ... I am really considering leaving some part of the quality management system and keeping some other part even if it means that BRC small grain cereals will not be certified. I am sending next week the satisfaction survey to the 2022-2023 users and I will ask them if they know that we work under a certification norm (pretty sure they do not know about it, even if the stamps are on the documents they receive) and if the certification is important to them and why.

With the answers I will know if I have to maintain effort “to go after the stamp” or just keep what is useful to our BRC and leave parts of the system away to have time to work correctly with less man power. Even if that means that the BRC abandons its certification.

...

And one last thing : for sure we will not go to the accreditation norm ISO 20387. Accreditation is beyond our resources to manage.

...

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

The name of the genebank is : Centre de ressources biologiques “Céréales à paille” in French and Small grain cereals biological resource centre in English

The WIEWS code for our BRC is FRA040. Here is the link : [Organizations | WIEWS - World Information and Early Warning System on Plant Genetic Resources for Food and Agriculture | Food and Agriculture Organization of the United Nations \(fao.org\)](#)

- What is number of accessions in your genebank, and type of crops (very brief)?

We have currently 27 606 different accessions. The biggest collection is the wheat collection (~17 400 accessions with 14 000 hexaploid and 3 400 tetraploid). Then it is the barley collection which gathers ~6 600 different accessions. Comes next the oat collection with ~1600 accessions, the triticale collection with 1450 accessions. We have a small collection of rye population (80 accessions) and ~400 wild relatives almost all related to wheat (mainly aegilops)

- Do you upload your information to EURISCO?

Information on Eurisco about our accessions concern only the accessions part of the national collection. These accessions are the contribution of FRANCE to the ITPGRFA.

We do not upload any information on Eurisco ourselves, it is Audrey Didier, managing and animating the phylogenetic resources group at GEVES in FRANCE that upload informations on Eurisco.

Quality management

- Do you have a formal quality management system?

BRC small grain cereals is under quality management NFS 96-900 (French quality norm specific to BRC) since 1st of June 2015, renewed in 2018 and 2021 for :

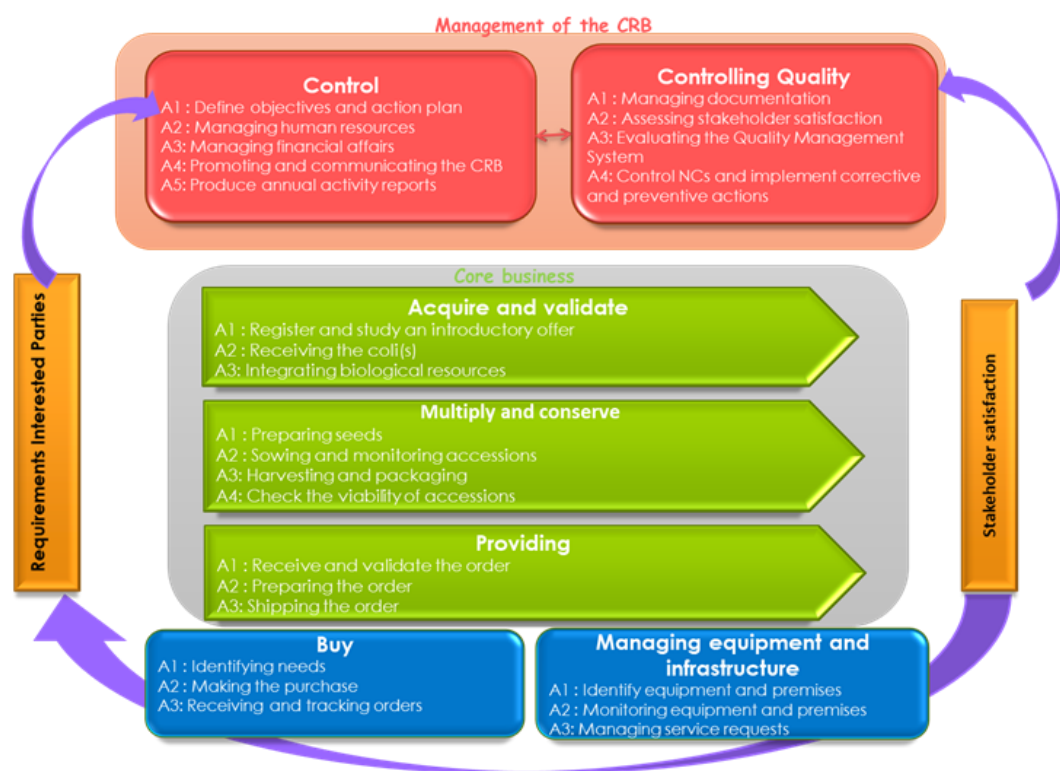
Reception, preparation, multiplication, conservation and provision of small grain cereal biological resources. This French specific norm is terminated and we are reviewing the possibility to migrate our actual system to the ISO 9001:2015 referentiel.

Unfortunately due to the departure of the colleague responsible of the quality management and the momentary departure of another colleague, I am struggling to maintain all by myself the quality management of our BRC. Internal Audit last week revealed minor deviation of our management system mainly due to me that focuses too much on operational tasks (according to the auditor) and not enough on the management tasks. We are only 2,5 people working in the BRC and at this time of the year I do not have time to “waste” (I should not say this but it is how I feel) filling excel files stating that agent XXXX did this and now is capable of that at the date. Accessions have to be sown in good condition and I prefer to focus on being ready to sow them when it is time (and that is the case this year) than filling files to please auditors (even if they say to you that you do not have to please them) and sowing in poor condition. This is kind of funny because it happened last year, nursery was poorly sown early December under very bad weather condition but hey, we had a good report from the auditor 😊 at the time. Better laughing at it than crying

Well, I feel the quality management as tiring and almost painful in some ways. I do not say that it is useless but it is too much time consuming for a small team that is already facing quite a lot of operational challenges. * end of the therapy session 😊 *

- Do you have written procedures for your genebank (Standard Operating Procedures)?

Yes we have written procedures for our genebank (it is due to the fact that NF S96-900 norm is what they call a “documentation” norm). Our system is based on 7 processus. Two of them are management processus, 3 of them are what we call “core business” processus and we have also 2 support processus. It is shown on the map below (English version is not up to date for the ISO norm but it will be close to that).



In total we have :

7 process master record (one for each processus)

21 Standard Operating Procedures

Unfortunately we do not want to disclose any document

We also have many indicators to monitor all the processus

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?

It should be exactly the same as what is available on Eurisco.

1766 wheats

570 barleys

602 oats

36 triticales

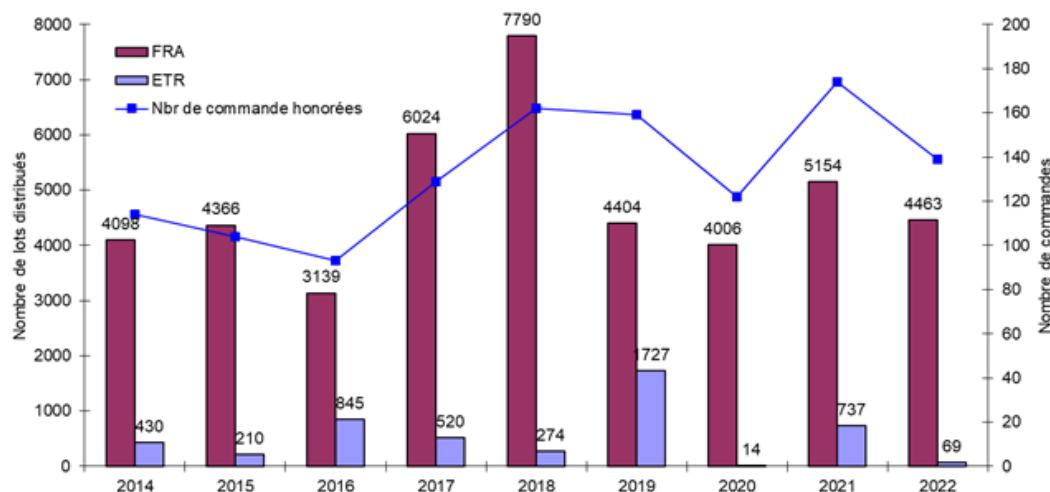
51 ryes

- Do you have a written policy regarding distribution of genebank accessions?

We have "Terms and conditions" (see file attached <005>). GDPR of the BRC is written, reviewed by our institute but I did not have time to translate it in english and to update terms and conditions to add it.

We accept every request if they are motivated. Under 100 accessions, I do not ask any question, more than 100 coming from a common civilian, not even a cultivator, I ask questions about its project. Only once since 2020 I had to investigate a bit and finally we filled the order totally.

- How many samples did you distribute in the period 2018-2022?

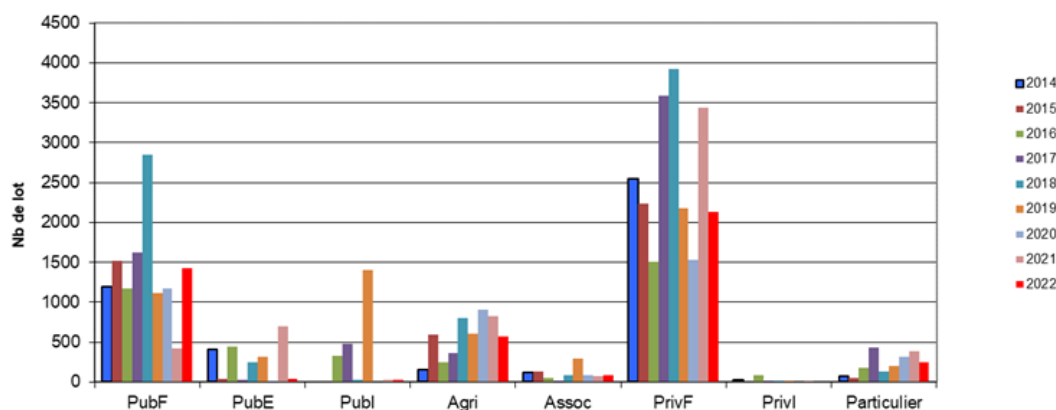


FRA for FRANCE, ETR for Abroad distribution, Nbr de commandes for number of order, Nombre de lots distribués for Number of samples distributed

On average since 2014: around 5,300 lots distributed and 130 orders filled per year

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
-

Between 2018 and 2022 : 25 817 samples sent in France, 2 821 sent abroad, for a total of 756 orders



Visual evolution of the distribution per users in number of samples

PubF : French public research

PubE : European public research

Publ : International public research

Agri : cultivators

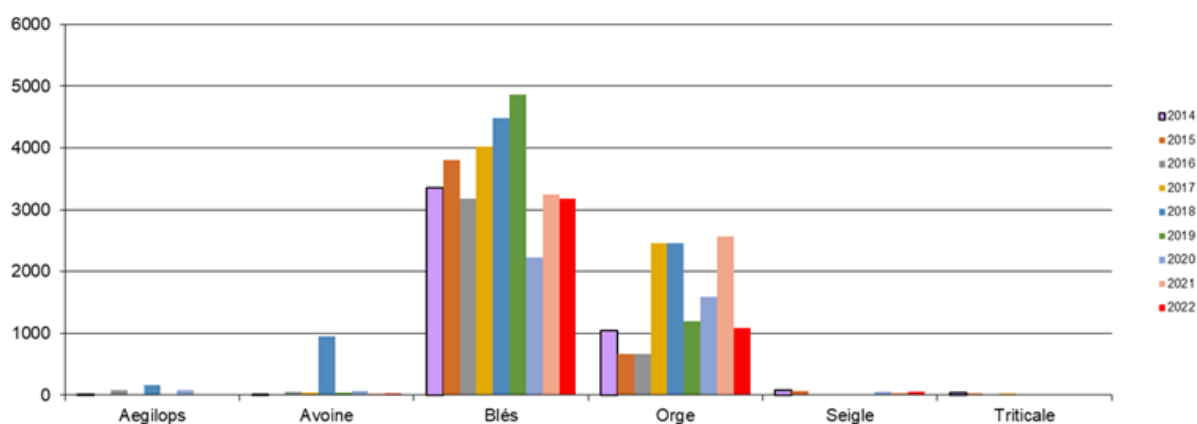
Assoc : association

PrivF: Private Breeding Companies

PrivI : International private breeding companies

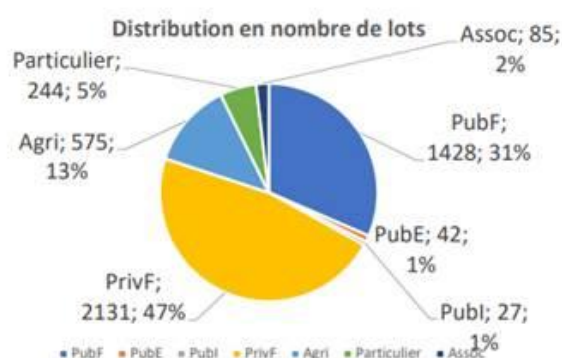
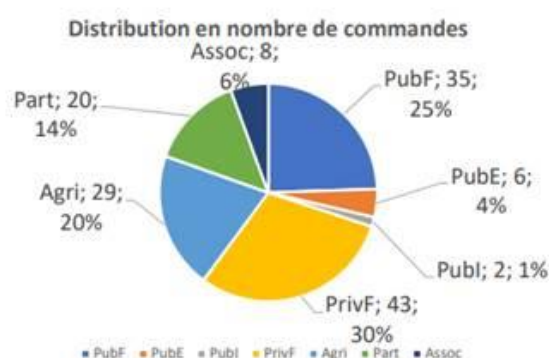
Particulier : Common civilian

PrivF seems to be really high compared to the other but it is because they are part of the BRC nursery evaluation trials in which they are evaluating resources of the BRC. In fact they are helping describe our collection for the wheat and barley collections (each year they are evaluating 100 wheat and 100 barleys).



Just to show that we are mainly distributing wheats and barleys, very few of the other species.

In 2022 :



On the left the number of orders per type of users, on the right the number of samples distributed per type of users

Just to show that in terms of number of orders, 60% are for research (public and private) and 40% for cultivators, association, and civilians but in terms of number of samples it is 80% for research and 20% for cultivators, association and civilians.

Standards

- Are you aware of the FAO Genebank Standards?

Funny things, I received today a document about it but it seems quite old (see attached document <006>), is there a more recent version of this or another type of document?

- o If yes, do you think they are suitable as a basis for genebank certification?

Did not have time to read it yet

- o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

- What other standards is your genebank using in terms of genebank management?

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?

<follow-up>

I would like that the main and core message of my interview in the report to be : **“Quality management is useful for a BRC but it needs resources (human and time) to be maintained over time. It is not a “one time” effort”**

FRA BrACySol BRC, France

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

The name of the genebank is BrACySol BRC, supported by two INRAE units: the joint Research Unit Institute of Genetics, Environment and Plant Protection (IGEPP) and Experimental Unit Genetic Resources in Oceanic Conditions (RGCO). The FAO institution code of IGEPP is FRA010, and of RGCO is FRA179.

- What is number of accessions in your genebank, and type of crops (very brief)?

Solanum: potato and related species: 12 000 accessions

Brassica: 1200 accessions of vegetable crucifers and 2200 accessions of oilseed crucifers (cabbage, turnip, rapeseed and mustard)

Allium: 120 garlic accessions and 300 shallot accessions

- Do you upload your information to EURISCO?

Some information from our collections are uploaded to EURISCO. It has been performed by the head manager of INRAE genetic resources or by Audrey Didier.

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)

Yes, ISO 9001. Certification obtained in July 2021

- Do you have written procedures for your genebank (Standard Operating Procedures)?

- If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

Yes.

Procedures: 10

Instructions: 20

Operating modes: 70

- If yes, you be willing to share your documents?

These documents are adapted to our organisation. Some of them need to be revised. I am not sure that all of them are relevant for other genebanks. I think that some of them could be shared but it should be discussed internally. However they are all in French.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

- If yes, what part?

Yes.

Potato: 117 varieties

Rapeseed: 60 breeding lines (to come)

- Do you have a written policy regarding distribution of genebank accessions?

- If yes, could you send it (we can translate it from your language into English)?

- If no, could you briefly describe your distribution policy?

Potato: We have a partnership agreement with the French breeders: they have a 5-year exclusivity on scientific or pre-breeding material <only this line is specific for potato>

Distribution through research collaboration

For the varieties that are still registered, distribution only with the agreement of the breeder

Distribution with signature of a MTA, in accordance with the international regulations (Nagoya protocol)

- How many samples did you distribute in the period 2018-2022?

6500 samples

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

INRAE teams: 19%

French public institutes (other than INRAE): 6%

International public institutes: 11%

French private company: 48%

International private company: 6%

Associations, farmers...: 10%

Standards

- Are you aware of the FAO Genebank Standards? Yes

- If yes, do you think they are suitable as a basis for genebank certification?

They are good guidelines for the definition of standards. But they are not suitable for all uses or all the different users of these genetic resources.

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

- What other standards is your genebank using in terms of genebank management? Standards that we have defined internally

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?

- If no, why not?

What benefits could be obtained from such certification? We already have ISO 9001 certification, that we obtained recently. For now, I do not think that we have financial and human resources to commit to another certification process. Maybe later, depending on the advantages that could be obtained.

FRA Prunus-Juglans Biological Resource Center, France

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

Name of the genebank : Prunus-Juglans Biological Resource Center

This genebank is part of INRAE, FRA015 and is managed by 3 INRAE units (= teams) :

- Mine: Unité Expérimentale Arboricole (UEA) - FRA326, managing collections in the South-West of France
- Unité de Recherche Génétique et Amélioration des Fruits Et Légumes (UR GAFL) - FRA011 managing collections in the South-East of France
- Unité Expérimentale Arboriculture et Maraîchage Méditerranéens (UE A2M) – no FAO CODE

- What is number of accessions in your genebank, and type of crops (very brief)?

3300 accessions :

Juglans : 400 Walnut accessions

- 235 accessions of *Juglans regia* cultivars (selected for fruit, ornamental or rootstock)
- 40 accessions of wild *Juglans regia* genotypes
- 125 accessions of crop wild, and not wild, relatives of *Juglans regia* (belonging to 15 species)

Prunus : 2900 accessions

- 950 Apricot accessions (*Prunus armeniaca* and wild relatives)
- 570 Cherry accessions (P. avium, P cerasus, P x gondouinii and relatives)
- 590 Plum accessions (P. domestica, P salicina and relatives)
- 200 Almond accessions (P. dulcis and relatives)
- 540 Peach accessions (P. persica and relatives)
- 50 Prunus rootstock accessions

- Do you upload your information to EURISCO? Only for 196 accessions

Quality management

- Do you have a formal quality management system?

No – only a French quality label (“IBISA” - Infrastructures de recherche en biologie, santé et agronomie)

We plan to be certified with ISO 9001 in 2025

- If yes, what? (ISO 9001 or another?)

- Do you have written procedures for your genebank (Standard Operating Procedures)?

Yes – but quite old and we plan to update them in 2024

- If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

4 Process descriptions

7 procedures

5 instructions

26 forms

- If yes, you be willing to share your documents?

No for the moment, but yes after update of or documentation

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

NO: our species aren't part of 'Annex 1' – only some accessions obtained with sMTA (<10)

- o If yes, what part?

- Do you have a written policy regarding distribution of genebank accessions?

YES

- o If yes, could you send it (we can translate it from your language into English)?

see first page of EN-CRB-DIF-001 - Fiche de DemandeV3.docx <018>

- o If no, could you briefly describe your distribution policy?.

- How many samples did you distribute in the period 2018-2022? 1066 samples only for South-West Collection (about 2000 accession) – For south-east collections, this is not yet counted
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.? yes :

Catégorie demandeur	from	2018	2019	2020	2021	2022	Total général
Farmers	France			0	6		6
Other genebank	France	1		30			31
Public organization	Foreign				3	40	43
Non-professional	France	6	16	20	3	11	56
Nursery-Breeders	Etranger		14		2		16
Nursery-Breeders	France		16			22	38
Researchers from our institute INRAE	France	57	311	138	72	111	689
Research and development	Etranger		22	11			33
Research and development	France	26	0	110	10	8	154
Total général		90	379	309	96	192	1066

Standards

- Are you aware of the FAO Genebank Standards? yes
 - o If yes, do you think they are suitable as a basis for genebank certification? I would say 'yes' with adaptation for each specie, even if some points are, I think, not "realistic" (for example: 5.1.1 The agro-ecological conditions (climate, elevation, soil, drainage) of the field genebank site should be as similar as possible to the environment where the collected plant materials were normally grown or collected)
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? Yes for a lot of points. Main 'deviations' :
 - all the accessions aren't characterized
 - we need to check the legal status for some 'old' accessions (cf Nagoya etc)
 - we haven't duplication for all accessions, only for a little part (duplication under insect-proof greenhouse)
 - we have material (trees) with regulated pests and we can't use thermotherapy (too expensive + some regulated pests are very common for our species, and spread by insects or pollen)
 - we should complete and update our written "risk management strategy"
 - the minimum of properly trained personnel is'nt available to fulfil the responsibilities of ensuring that the genebank can acquire, conserve and distribute germplasm.
- What other standards is your genebank using in terms of genebank management? No one

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
YES
 - o If yes, what support would you need? – we need above all human resources
 - o If no, why not?

FRA Centre de Ressources Biologiques Prairies, France

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Name: Centre de Ressources Biologiques Prairies
FAO code : FRA001
- What is number of accessions in your genebank, and type of crops (very brief)?
Round 900 accessions from forage and turf grass species and forage perennial legumes
- Do you upload your information to EURISCO?
731 accessions already in EURISCO, 150 others to come in next future

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)
Our genebank is certified under ISO9001 v.2015 norm
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
6 procedures, 14 operating modes, 4 instructions
 - o If yes, you be willing to share your documents?
Yes, we can share these documents.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?
531 accessions were notified as part of the MLS by France (contracting party) in 2013.
Round 300 new accessions are to be notified in 2024.
- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?
Yes, this policy is joined to the email in another file. <009>
 - o If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
Round 1500 samples have been distributed during this period.
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?
French academic labs (including INRAE): 40%
Foreign academic labs: 35%
French plant breeders: 10%
Foreign plant breeders: 10%
Others (farmers, private individuals): 5%

Standards

- Are you aware of the FAO Genebank Standards?
Yes, we are.
 - o If yes, do you think they are suitable as a basis for genebank certification?
They are of course a very relevant frame for guidelines, and possibly more.

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Yes, it complies with the main guidelines

- What other standards is your genebank using in terms of genebank management?

We have been working under the standards of the ECPGR Working Group for Forages since many years, especially regarding standards for storage, regeneration and safety duplication.

We have mostly undertaken characterisation and evaluation work in the frame of research projects which had their own standards, but many traits were collected in agreement with usual practices of the international forage community.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need? Yes, ...
 - If no, why not?

We agree that it is of major importance to have common standards for the management of genebanks. But we wonder whether certification is necessary, maybe guidelines would be sufficient. In any case, we think that ECPGR should be involved in setting up a certification process. A lot of work towards standardization has already been done in several ECPGR working groups, including the forage species group, and this should be taken into account, at least to make sure that there would not be inconsistencies with a future common norm.

We are also aware of another certification project: adaptation of ISO 20387 norm to plant genebank (ISO 23105). This project is perhaps not focused towards cultivated plants. But we should avoid fragmentation of the community.

The last concern is that we are already fairly loaded with national approvals or certifications. In France, we need to write an application for approval from the ministry of agriculture (gestionnaire de collection, with Audrey Didier), and another one for approval from the ministry of higher education and science (Ibisa). And we also need to work to maintain ISO9001 certification. Thus we have limited time to commit in new certification and audit processes.

FRA BRC Carrot and other vegetable Apiaceae, France

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

CRB Carotte et autres Apiacées légumières / BRC Carrot and other vegetable Apiaceae

Institut Agro IRHS

FAO code : FRA250

- What is number of accessions in your genebank, and type of crops (very brief)?

1570 accessions of carrot (among which about 407 wild relatives)

706 accessions of tuberous rooted chervil (*Chaerophyllum bulbosum*)

~30 accessions of other vegetable Apiaceae

- Do you upload your information to EURISCO?

Only the national collection of carrot (89 cultivated and 34 wild accessions) are uploaded in Eurisco. The characterization data are uploaded only for the cultivated accessions. The data for the wild accessions will be added later.

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?) yes ISO 9001:2015 since Nov 30
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

Procedures : 5

Instructions : 27

Operating modes : 10

Records : 73

External documents : 13

- If yes, you be willing to share your documents?

We are not experts yet, I imagine that others are in better positions, but why not not for specific topics. I would be interesting to have a standard basis as we have similar genebanking activities, even if they need to be adapted depending on the situations. However, all our documents are in French...

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?

The above national collection (89 cultivated and 34 wild).

- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?

Yes, I attach it , we use a logogram. However, the decision regarding the juridic status of the accession which determines if we can distribute it or not is in the database (conform or not). We also have 3 main types of MTA depending on the user. We still need to create a procedure for the type of MTA to use.

- If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?

793 samples (+ for our own research team)

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

18 requests

50% abroad but because we had a european project. Quite limited otherwise

261 samples for public research, 3 growers, 528 seed companies breeders and prebreeders

Standards

- Are you aware of the FAO Genebank Standards?
 - If yes, do you think they are suitable as a basis for genebank certification?

Yes, I am aware. They are good standards as objectives, but they don't correspond to the reality of genebanks as discussed in the ECPGR Umbellifer group when I was Chair. At that time, we decided some minimum standards that all could manage to reach instead of ideal standards that people don't even try to reach since too far. Regarding certification, it is a good reference, but we included only aspects we could reach. We actually did not make reference explicitly to the FAO standards, probably also because we integrated it already in our reasoning.

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Overall, I think we comply with the standards. If I recall well, the main topics of difference : minimum germination level (higher in FAO stds versus trade, also for wild relatives), seed sanitary aspects (new EU regulation), long term collection (in progress...) and security duplicate in another country (in progress also, maintained in France for practical reasons). I would need to check again the FAO standards.

- What other standards is your genebank using in terms of genebank management?

No other "official" standards. We use the "Chart" and the "Internal rules" document for Genetic resources network under the national coordination (cf Audrey Didier). Important exchange of practices within the French group of genebanks (RARE group in which several working groups on genebank topics).

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
 - If no, why not?

I am not willing to commit to this as 1/ I am not an expert , 2/ we just got the ISO9001 certification, 3/ we recently spent a lot of time on certification (43 internal meetings in 2023 alone) and we need to move to other aspects (even if certification is only the start, not the end). However, as mentioned in the beginning, I think useful to have some standard protocols, procedures ect... for genebanks, that people can adapt to their practice. So I am ok to share experience if of some interest but no investment on a regular basis.

GBR Commonwealth Potato Collection, The James Hutton Institute, UK

Identification

- What is the name of the genebank, institution and if possible, the FAO institution code? The Commonwealth Potato Collection, The James Hutton Institute, GBR251
- What is number of accessions in your genebank, and type of crops (very brief)? Our genebank contains 1532 accessions of wild and primitive cultivated potato species.
- Do you upload your information to EURISCO? Yes (I think we need to update this as the information showing is not current)

Quality management

- Do you have a formal quality management system? Yes
 - o If yes, what? (ISO 9001 or another?) We work under ISO 9001.
- Do you have written procedures for your genebank (Standard Operating Procedures)? Yes
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)? We have an overall Commonwealth Potato Collection SOP and the following accompanying working instructions (SEP)

Seed Germination

Seed Viability testing

Care of Established plants

Pollination and Fruit management

Seed Extraction and Processing

We also have an overall SOP for the operation of the Seed Store Facility and working instructions for submission of material into the Seed Store Facility.

The Science and Advice for Scottish Agriculture (SASA) agency carries out yearly virus testing of rejuvenated material. To comply with quarantine measures we follow the SOP created by the Potato Quarantine Unit regarding sampling of plant material for virus testing. We refer to this document in both our SEP and SOP's.

- o If yes, you be willing to share your documents? Yes, we are hoping to make these available through our Germinate CPC online database. A few of the work instructions are currently being updated to reflect current practices. We would need permission to share the associated SASA SOP for quarantine testing of material.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? Yes
 - o If yes, what part? We have 1109 accessions available for distribution (this does not include the TPS from the 2023 rejuvenation process)
- Do you have a written policy regarding distribution of genebank accessions? Yes
 - o If yes, could you send it (we can translate it from your language into English)? Yes, we use the ITPGR sMTA which I will send <007>. In addition to this in our CPC SOP we only distribute accessions where we have more than 1500 seed in the base collection.
 - o If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022? In total we distributed 1439 accessions to users.

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

Over this period 923 accessions were domestic distribution and 516 "other". This fulfilled 44 requests from users of which all requests were for research purposes.

Standards

- Are you aware of the FAO Genebank Standards? Yes, we try very hard to adhere to chapter 4 – Genebank standards for orthodox seeds.
 - o If yes, do you think they are suitable as a basis for genebank certification? Yes
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? Yes, I think overall we come very close to compliance. Our major problem has been lack of staff and because of this there was no regular programme for monitoring seed viability (4.3) (viability was monitored during germination for regular rejuvenation cycles but not in a consistent way and with no official recording method). A process to regularly test and record seed viability has been started recently and we aim to add this information to our Germinate database over time.

In addition, as we are a historical genebank most of section 4.1 does not really apply to us as we are not involved in active acquisition except 4.1.4 where we ensure that any accessions received from other collections come with full passport information.

Characterisation of material is also an area where we can continually improve, and we are working with other researchers to add additional data to our database as and when it becomes available.

We do not have field collections or *in vitro* or use cryopreservation.

- What other standards is your genebank using in terms of genebank management? Our data is distributed through Germinate which is MCPD compliant, Dublin Core compliant, BrAPI compliant and working towards MIAPPE compliance in collaboration with IPK. We are also working closely with the Crop Trust to develop closer integrations with Genesys.

Future

- Would your genebank be interested in working towards certification (i.e., improve protocols to meet standards that we agree on and be open to external auditing)? Yes

(This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

- o If yes, what support would you need? Staff resources. (Currently the practical element of managing the collection is carried out with 1 technical post and myself. I have my time split between this and commercial breeding work. We do have excellent data management support which makes things so much easier. We hope to also have new glasshouse facilities and a suite of new labs within the new National Potato Innovation Hub to allow us to expand the numbers of accession rejuvenated.)
- o If no, why not?

GBR UK National Fruit Collection, UK

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Genebank: UK National Fruit Collection
Institution: University of Reading
GBR030
- What is number of accessions in your genebank, and type of crops (very brief)?
Approx 3,500
Tree fruit (mostly Malus, Pyrus, Prunus [Plum and Cherry], Vitis, Corylus)
- Do you upload your information to EURISCO?
Yes – all passport data
C&E data are planned for submission in the future

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)
No
- Do you have written procedures for your genebank (Standard Operating Procedures)?
Some – but these are largely informal and only written for local use
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
10-20 – focussed on plant health management, material supply and basic data collection
 - o If yes, you be willing to share your documents?
I'd be reluctant to make them public in their current format – because I think they are only of use in their local context. I would be happy to share them directly with other genebank managers in that context though.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?
Yes – the Malus collection is formally within the MLS (we voluntarily use the sMTA for supply of material from the remaining [non-Annex-1] species though)
- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?
Yes – although it is a 'working policy' created by ourselves as curators rather than being an official policy of the UK Government (who own the collection). It was not written for general publication but I would be happy to share directly with other genebank managers (and like all policy – is a 'work in progress')
 - o If no, could you briefly describe your distribution policy?
Fundamentally – it states that we supply all material for 'research, breeding or training for food and agriculture' under the sMTA (regardless of inclusion in Annex-1 of the Treaty) and only charge for orders in excess of 30 samples (and then at a reduced rate). Any material not for 'research breeding or training' is supplied under a second MTA (that states "not to be used for research, breeding or training for food and agriculture") and at a basic charge of £5 per sample plus postage.
- How many samples did you distribute in the period 2018-2022?
11,539 (noting that this is the number of physical samples of graft/budwood – not the number of batches/users)

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

Yes

Standards

- Are you aware of the FAO Genebank Standards?
- Yes
 - o If yes, do you think they are suitable as a basis for genebank certification?
Possibly, although I think some are idealistic and so would risk being exclusive
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
I think we comply with the principles – but I suspect we might not comply with all of them to the letter
- What other standards is your genebank using in terms of genebank management?
To an extent, our standards are ad-hoc – because the genebank is managed through a series of fixed-term contracts. Some standards will be dependent upon available funding.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?
Potentially – but, the standards that we work to will be dictated by the available funding – so it is not entirely within our power to commit to these in the long-term.

GBR Germplasm Resources Unit, JIC, UK

Identification

- What is the name of the genebank, institution and if possible, the FAO institution code?

UKRI-BBSRC Germplasm Resources National Bioscience Research Infrastructure

(better known as the Germplasm Resources Unit (GRU), JIC)

FAO code: GBR247

- What is number of accessions in your genebank, and type of crops (very brief)?

55,000 Accessions.

Main collections are: Wheat, Barley, Oat and Peas gene-pools (Crops, CWR, induced mutagenised and derived diversity sets)

- Do you upload your information to EURISCO?

YES, ~27,000 MLS germplasm form part of the UK national list that is submitted to EURISCO and annually updated.

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)

No

- Do you have written procedures for your genebank (Standard Operating Procedures)?

Yes

- o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

These are protocols for:

Harvesting
 Phenotyping (diverse traits) and contexts
 Choosing germplasm for regeneration
 Germination tests
 Safety Duplications

○ If yes, you be willing to share your documents?

- Some work will be needed for sharing those that are relevant. But generally, am happy to share anything we have.
- Some SOPs are written as internal documents and relate to the way we operate with other JIC specialised groups (field trials that bulk up our seed, Horticulture Services that grow our precise stocks, genotyping platforms that extract DNA and use KASP markers for quality checks etc) so, these are perhaps not always relevant out of JIC research-genebank context.
- Most of our SOPs are not documents, but procedures streamlined into our management system. E.g., all the MTAs related activities (generating the document, track record and reporting it to FAO/ funders) are semi-automated. This is true for all the set of activities in response to seed orders, all aspects of the regeneration cycle (choosing the lines, comparing to descriptors, updating stocks..) germination tests records and so on, are all executed and documented on our management system, so are uniformed by being coded and streamlined routing rather than by a written SOP document that is straightforward to share.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?

MLS: 27K out of 55K accessions

- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?

I am not entirely sure what do you mean by policy.

All the collections are here: <https://www.seedstor.ac.uk/>, searchable with passport (and other) information and links. Only publicly available accessions (now ~55K) can be viewed and ordered by the public. Other (say with low seed stock waiting regeneration) are only searchable by the curator. Each accession has a URL with information.

For each collection, an information button (i) exists with the related MTA, associated cost recovery policy and description can be found.

<https://www.seedstor.ac.uk/search-browsecollections.php>.

General cost recovery statement is here:

<https://www.seedstor.ac.uk/GRU-CostRecovery.php>

○ If no, could you briefly describe your distribution policy?

- How many samples did you distribute in the period 2018-2022?
 ~25,000 packets of seeds
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

in response to ~1420 jobs/ projects.

Sent To 49 countries.

25% are JIC crop scientists. 45% are UK based, not JIC. 30% international users.

15% are industry (mostly breeders), 65% academia and research. 10% education, 10% others.

Standards

- Are you aware of the FAO Genebank Standards?

YES.

- o If yes, do you think they are suitable as a basis for genebank certification?

I can only reply for our genebank:

For us they are being used as a reference point. So, while we don't follow them as 'instructions', when we deviate from them, it is following a thinking process re the reason of such deviation. I think they are helpful. Since the funding, capabilities, remit and objective differ between genebanks, standardising is not always possible or beneficial.

- o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Generally, MLS, natural diversity that is unique to our genebank (in terms of conservation responsibility) is considered highly important and is curated to higher standard. Some deviation include the handling of derived and induced diversity that is considered expensive, but not priceless (can be generated again if lost).

- What other standards is your genebank using in terms of genebank management?

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?

As a reference point, we would be happy to use new standards and update our work accordingly in discussion with the community, JIC management and our funders. Formal certification might be too time consuming for our management (ME 😊) so this might not be prioritised.

GEO Field crop Gene bank under Scientific Research Center of Agriculture (SRCA), Georgia

Identification

Name of the Gene bank – Field crop Gene bank under Scientific Research Center of Agriculture (SRCA) under standardization and certification department.

FAO /View Institute code GEO040

Number of Accession -2000 accessions

Main crop – Wheat, Bean, Maize.

In EURISO about the gene bank there is no information, it's will be uploaded in May.

Gene bank based in Mtskheta Municipality, Village Tsilkani

...

Collection type : this time only working collection , Active and Base collection will be ready next year

The main activities of the Field Crops Gene bank:

- ✓ **Collection of plant genetic resources;**
- ✓ **Admission to the gene bank;**
- ✓ **Morphological Characterization of the material;**
- ✓ **Storage as a seed collection;**
- ✓ **Documentation of plant genetic resources;**
- ✓ **Study of plant genetic resources standards.**

Existing material-technical resources

№	Research infrastructure and equipment in the host and co-participant institutions	Location Indicate exact location (either in the host or co-participant institutions)
1	Accredited Laboratory (ISO 17025) of the Filed Gene bank For determining Seed material quality	Mtskheta Municipality, Village Tsilkani
2	Plots of PGR gene bank – to conduct characterization process and organize morphological traits	Mtskheta Municipality, Village Tsilkani
3	Two refrigerators two (+2°C-8°C) for Active collection BDF 25V270	Mtskheta Municipality, Village Tsilkani
4	Two refrigerator's (-18°C-22°C) for basic collection CNS-101	Mtskheta Municipality, Village Tsilkani
n ¹	LMS Cooled Incubator, Model 80 for seed drying	Mtskheta Municipality, Village Tsilkani
	Seed Storage room for Working collection	Mtskheta Municipality, Village Tsilkani
	Binocular Stereomicroscope	Mtskheta Municipality, Village Tsilkani
	Balances. Seed divider, Seed blower, Sieves, Growth chamber, Grinding mills, Moisture meter, Safety cabinet, Containers (3 liter)	Mtskheta Municipality, Village Tsilkani
	Laboratory furniture (Lab desks, tables, benches)	Mtskheta Municipality, Village Tsilkani

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?)

For Genebank -NO
 - Do you have written procedures for your genebank (Standard Operating Procedures)?
- Not yet, it's in preparation process**

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

Not Yet

- Do you have a written policy regarding distribution of genebank accessions?

Not Yet. Still there is not enough material for Distribution

Standards

Are you aware of the FAO Genebank Standards?

YES

If yes, do you think they are suitable as a basis for genebank certification?

YES

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Gene bank using FAO standards for collecting mission, for acquisition and for the storage of PGR

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

YES

Support is needed to implement:

Standard operating procedures (SOPs?)

Have knowledge about the Gene bank Metrics

Get fund for the ISO9001 certification

HRV The National Plant Genebank, Croatia

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

In Croatia the name of our genebank is - The National Plant Genebank and it is decentralized. It consists of a large number of collections that are kept by different entities, in the form of seeds, planting material and field collections. The coordination of the work of all entities involved in the National Plant Genebank is carried out by the Commission for Plant Genetic Resources. The Ministry of Agriculture designates entities for maintaining collections of certain plant species or groups of species that are part of the National Plant Genebank. The designation of entities by the Ministry is regulated by the signing of an Agreement in which it is clearly determined which plant species the entity is responsible for and what its rights and obligations are. The Ministry also concludes agreements with entities that, for the purposes of the National Plant Genebank, participate in the activities of collecting, duplicating or describing accessions. By signing the Agreement, the subjects commit themselves to long-term participation in the work on the preservation of plant genetic resources.

The National Plant Genebank entities:

Nr.	Institution	FAO code
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1	University of Zagreb, Faculty of Agriculture	HRV041
2	Bc Institute for breeding and plant production	HRV015
3	Faculty of agrobitechnical sciences, Osijek	HRV045
4	Croatian Agency for Agriculture and Food- Center for Seed and Seedlings, Osijek	HRV053
5	Croatian Agency for Agriculture and Food- Center for Pomology and Vegetable Crops, Zagreb	HRV054
6	Institute for Adriatic Crops and Karst Reclamation, Split	HRV048
7	Institute for Agriculture and Tourism, Poreč	HRV050
8	Agricultural Institute Osijek	HRV021
9	University of Dubrovnik, Department for Mediterranean Cultures	HRV049
10	University of Split, Department of marine studies	HRV061
11	KRIŽEVCI UNIVERSITY OF APPLIED SCIENCES	HRV044

- What is number of accessions in your genebank, and type of crops (very brief)?

Number of accessions	
Cereals & Maize	610
Industrial Crops	106
Vegetables	331
Fodder Crops	208
Fruit Crops	481
Vitis	147
Medicinal & Aromatic Plants	2666
Total	4549

- Do you upload your information to EURISCO?

Yes, we upload informations once a year, last years by the end of December every year.

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)

Yes, we have formal quality management system ISO 9001 <see follow-up below>

- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - o If yes, you be willing to share your documents?

We do not have written procedures for our genebank as Standard Operating Procedures. We apply FAO Genebank Standards. <see follow-up below>

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?

Yes, a part of our collections is a part of the ITPGRFA MLS.

Apple, Barley, Beans, Beet ,Bird's foot trefoil, Brassica Complex, Dactylis, Festuca, Lolium, Lotus, Lupinus, Maize, Medicago, Oat, Pea, Phelum, Raphanus, Trifolium, Triticale, Wheat

- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?
 - o If no, could you briefly describe your distribution policy?

We do not have written policy regarding distribution of genebank accessions, we apply the conditions for the exchange of genetic resources as from the Multilateral System which are defined by the Standard Material Transfer Agreement (SMTA), which is signed during each distribution.

- How many samples did you distribute in the period 2018-2022?

In period 2018-2022 from our National Plant Genebank we distributed 28 samples. <see follow-up [below](#)>

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

Number of requests: 5, Abroad sent: 20 %, User category: university departments for genetics and breeding, breeding companies

Standards

- Are you aware of the FAO Genebank Standards?
 - o If yes, do you think they are suitable as a basis for genebank certification?

Yes we are and we find it suitable as a basis for genbank certification.

- o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

As far as now, our institutions that are entities in National Plant Genebank comply to FAO Genebank standards.

- What other standards is your genebank using in terms of genebank management?

We follow also agreed quality standards of a European Genebank Integrated System, AEGIS and EURISCO passport data.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?

In the future we are open for work on improvement of quality system if it leads also towards certification. We would need support in preparing/writing harmonised standard operating procedures.

< follow-up correspondence >

You indicate that you are certified under ISO9001, does that apply to all eleven contributing institutions or only your own?

My own institution (Croatian Agency for Agriculture and Food) has ISO9001, some of other contributing institution have also ISO9001 (like University of Zagreb-Faculty of Agriculture, University of Dubrovnik - Department for Mediterranean Cultures).

And I thought that to get ISO9001 certified one needs to have written protocols, so it surprised me to see that you do not have them. Could you elaborate?

We do have written protocols within ISO9001, which are covering more administrative side. For Genbank we do not have separate written protocols like for example for Entrustment of CPVO or ISTA accredited laboratory.

The 28 distributed samples, is that the total of all eleven institutions?

Yes, 28 distributed samples are in total.

HUN National Centre for Biodiversity and Gene Conservation, Hungary

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
 - National Centre for Biodiversity and Gene Conservation (HUN003)
- What is number of accessions in your genebank, and type of crops (very brief)?
 - 57 201 accessions

Propagation	Crop / plant group	Number of accession	
Generative	Cereals	21343	54087
	Vegetables	10738	
	Food legumes	10002	
	Industrial crops	3040	
	Forage legumes	2823	
	Grasses	2298	
	Herbs	1163	
	Other*	688	
	Wild species of the Pannon Seed Bank	1992	
Vegetative	Onions	209	272
	Root- and tuber crops	63	
In vitro	Potato and its wild species	679	679
Fields	Fruit trees	1048	2163
	Ornamentals	996	
	Grape	119	
SUM:			57201

*: root and tubers, ornamentals, fruits

- Do you upload your information to EURISCO?
 - YES

Quality management

- Do you have a formal quality management system?
 - NO
- If yes, what? (ISO 9001 or another?)
 - ---
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - YES (partly)
- If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - Seed germination test
 - Drying process
 - Compilation of the annual recommendation list for multiplication and regeneration
 - Seed distribution
- If yes, you be willing to share your documents?
 - Yes

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - YES
- If yes, what part?
 - All
- Do you have a written policy regarding distribution of genebank accessions?
 - NO

- If yes, could you send it (we can translate it from your language into English)?
- If no, could you briefly describe your distribution policy?
 - The main guideline of the distribution policy is that it must not threaten the preservation of the accession. Quality and quantity requirements were set up:
 - There must be at least 3000 g of the accession concerned
 - Germination percentage should be minimum 60 %, and the test originated not later than 10 years;
 - The distributed amount is so called botanical amount;
 - The requesting institution should accept the condition of the SMTA in advance.
- How many samples did you distribute in the period 2018-2022?
 - 79801 samples
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

Partner	Seed request implemented					Sample distributed				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Home (hobby) gardener	1102	1204	1376	2394	2287	9305	9474	10919	19150	16615
Farmers	11	17	21	24	30	89	58	99	259	134
Local governments				1					3	
NGOs		5	3	1	4		2638	2945	2500	3964
Educational institutes	6	5	6	4	9	39	31	191	58	321
Research institutes	11	19	5	6	8	331	189	55	56	310
Museums, botanical gardens	1	2		4	2		1		42	25
SUM	1131	1252	1411	2434	2340	9764	12391	14209	22068	21369

<see follow up below>

Standards

- Are you aware of the FAO Genebank Standards?
 - YES
- If yes, do you think they are suitable as a basis for genebank certification?
 - YES
- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
 - Our genebank basically complies to these standards. The reason for the deviation is the lack of capacity and / or of resources (e.g. the time between two germination checking is sometimes longer than the period recommended by the standards, or the multiplication or regeneration of the accessions are postponed to later)
- What other standards is your genebank using in terms of genebank management?
 - MCPD
 - SMTA
 - Internationally accepted descriptors for characterisation
 - Germination:
 - MSZ 6354-3 (Hungarian Standards)
 - ISTA (2013): International Rules for Seed Testing

- Analytical laboratory operates using Hungarian Standards (MSZ) as it follows:
 - MSZ 6884-2: Sample collection
 - MSZ EN ISO 6498: Sample preparation
 - MSZ 6367-2: Purity
 - MSZ 6367-3: Moisture content
 - MSZ 6367-13: Starch content
 - MSZ 6367/15-84: Crude ash content
 - MSZ EN ISO 5983-2: Crude protein and nitrogen content
 - MSZ EN ISO 6865: Crude fibre content

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - YES
- If yes, what support would you need?
 - Official protocols,
 - Human resources;
 - Study tour, workshop, training, education;
 - If infrastructural improvement is needed, financial support is a must.
- If no, why not?

<as follow up following questions were asked: “I was surprised about the distribution statistics. 18332 requests in five years, wow, but even more surprising that 82% of your samples go to home gardeners, 15% to NGO's and only 1% to research institutes. Is that correct? If yes, it deviates very much from other genebanks that generally aim at the research/breeding community. Do you use SMTA also for the home gardeners? Do you have information about the number of requests/samples that leaves the country?”>

The data, however surprising they are, are correct. According to this data it seems the researchers and breeders show little interest in our collection at the moment.

For each seed request we use some kind of an agreement. In case of the research and breeding community we apply the classic SMTA. We use a simplified material transfer agreement for home gardeners, farmers and for our other partners.

Generally we register only a few seed requests originated abroad. The results of the last five years are summarised in the table below:

year	No of seed requests	Sample distributed
2022	18	66
2021	15	7
2020	12	58
2019	15	177
2018	8	378
Total:	68	686

ISR Israel Gene Bank (IGB), Israel

Identification

- What is the name of the genebank, institution and if possible the FAO institution code? Israel Gene Bank (IGB)
- What is number of accessions in your genebank, and type of crops (very brief)? 47,000 accession of the wild plants of Israel (include its CWR and endangered species), Israel local Landraces.

- Do you upload your information to EURISCO? Yes

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?) No
- Do you have written procedures for your genebank (Standard Operating Procedures)? We have a systematic software and app of all procedures in the Gene Bank. The processes are guided by the software and includes all necessary working details.
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - o If yes, you be willing to share your documents? I am not sure how it is technically possible since it is part of an automatic process.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? Not yet
 - o If yes, what part?
- Do you have a written policy regarding distribution of genebank accessions? NO
 - o If yes, could you send it (we can translate it from your language into English)?
 - o If no, could you briefly describe your distribution policy? The collection is open for all. We will distribute within Israel every accession we have (Except from the cannabis collection which is available only to ones holding the needed permits). We will distribute outside the country only collection originally from Israel or ones that were sent to us by the SMTA.
- How many samples did you distribute in the period 2018-2022?
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.? attached PDF <008> (I translated the requested part from our annual report)

Standards

- Are you aware of the FAO Genebank Standards? vaguely
 - o If yes, do you think they are suitable as a basis for genebank certification?
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
- What other standards is your genebank using in terms of genebank management? We are following the MSB (Kew gardens) manuals and standard procedures for the collection and seed conservation.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there) I can say yes however it is all depend on our budget abilities to hold these standards.
 - o If yes, what support would you need?
 - o If no, why not?

ITA Mediterranean Germplasm Genebank, Italy

Identification

* What is the name of the genebank, institution and if possible the FAO institution code?

Mediterranean Germplasm Genebank, Institute of Biosciences and Bioresources (IBBR) of the Italian National Research Council (CNR), **ITA436** (FAO institution code)

* What is number of accessions in your genebank, and type of crops (very brief)?

Around 58,000 accessions, with wheat, barley, legumes and vegetables making up the largest proportion of the collections in terms of numbers (see: https://www.ibbr.cnr.it/mgd/?action=mgd_chart&fld=genus)

* Do you upload your information to EURISCO?

Yes, our data is also contained in EURISCO, currently around 7,000 accessions. But the entire collection will be indexed in EURISCO after an internal census, which is currently underway

Quality management

* Do you have a formal quality management system?

No, no formal quality management system has been introduced to date

* If yes, what? (ISO 9001 or another?)

/

* Do you have written procedures for your genebank (Standard Operating Procedures)?

No, no formal document has been produced, but over the years a list of internal procedures has been developed for those involved in seed conservation. The guidelines for genebanks of the IBPGR [FAO. 2014. *Genebank Standards for Plant Genetic Resources for Food and Agriculture. Rev. ed. Rome*] are used as a guide together with the guidelines of the Italian *Linee Guida per la conservazione e la caratterizzazione della biodiversità vegetale di interesse per l'agricoltura* by Marino et al. (2012)

* If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

/

* If yes, you be willing to share your documents?

/

Distribution

* Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? * If yes, what part?

Yes, wheat and barley collections

* Do you have a written policy regarding distribution of genebank accessions?

Information on the distribution policy is available on the Genebank website and an online application form has also been created (see: <https://www.ibbr.cnr.it/mgd/?action=page&id=policy>)

* If yes, could you send it (we can translate it from your language into English)?

As mentioned above: The Mediterranean Germplasm Database (MGD) provides germplasm exclusively to support research and educational projects. The accessions listed in the MGD are available in small quantities for research, breeding and educational purposes.

Due to the intensive efforts and resources required to ensure the availability of the germplasm, we are not able to distribute the germplasm for home gardening or other purposes where readily available commercial cultivars may be used.

When requiring seed materials, we ask to describe what use the requester intends to make of the requested material e.g. for research, breeding or education. Non-confidential information about the results of these research, breeding or educational efforts is greatly appreciated. Such information is valuable for further support of the MGD germplasm conservation and distribution programs.

* If no, could you briefly describe your distribution policy?

/

* How many samples did you distribute in the period 2018-2022?

1,417 samples in total: 2018 (159), 2019 (599), 2020 (104), 2021 (419), 2022 (136)

* Can you give statistics regarding the distribution in the period

2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

30 percent of inquiries come from abroad. The remaining from Italy, 15 percent are requests from IBBR researchers. The inquiries mainly come from research institutions.

* Are you aware of the FAO Genebank Standards?

Yes, we are aware of the FAO Standards

* If yes, do you think they are suitable as a basis for genebank certification?

YES

* If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

I believe our gene bank meets these standards

* What other standards is your genebank using in terms of genebank management?

In some cases we follow the guidelines of the Italian *Linee Guida per la conservazione e la caratterizzazione della biodiversità vegetale di interesse per l'agricoltura* by Marino et al. (2012).

In specific cases, e.g. for germplasm collected and stored in the context of local projects financed by Italian regions, we follow their indications especially for the distribution of genetic material.

* Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

Yes, we think it would be a step forward for our genebank

* If yes, what support would you need?

It would be useful to consult with institutions that have obtained certification in order to plan the specific measures to be implemented.

Visits by IBBR staff to facilities that work according to a certification system would be helpful

* If no, why not?

LVA LVMI "Silava", Genetic Resource Centre, Latvia

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Latvian State Forest Research Institute "Silava", Genetic Resource Centre, LVA009,
- What is number of accessions in your genebank, and type of crops (very brief)?

More than 2000 acc. (May 2023 - 2047 acc.), cereals, forages, flax, hemp, legumes, vegetables

- Do you upload your information to EURISCO?

Yes

Quality management

- Do you have a formal quality management system?

No

- o If yes, what? (ISO 9001 or another?)

- Do you have written procedures for your genebank (Standard Operating Procedures)?

- o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

Yes, 7 action instructions (in Latvian)

- o If yes, you be willing to share your documents?

They are written in Latvian, and need to be reviewed and probably updated/expanded

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?

- o If yes, what part?

Yes, all available accessions are part of the MLS. There may be some accessions not flagged as such in EURISCO, but this will be fixed when we do a full update of EURISCO from GENBIS (incl. DOIs).

- Do you have a written policy regarding distribution of genebank accessions?

- o If yes, could you send it (we can translate it from your language into English)?

No - we have a written procedure (no. 5) about distribution of accessions (written in Latvian), but no written policy

- o If no, could you briefly describe your distribution policy?

All available accessions are distributed with the SMTA.

- How many samples did you distribute in the period 2018-2022?

193 accessions

- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

Number of requests (sMTAs) – 34; 88% sent abroad, 38% for breeding, 47% for research, 15% for education. For more detail see attached Excel file (LVA009_SMTAs_2018_2022_summary.xlsx <017>)

Standards

- Are you aware of the FAO Genebank Standards?

- o If yes, do you think they are suitable as a basis for genebank certification?

Yes

- o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Our genebank complies to the majority of standards. Main deviation- not 100% of accessions are in safety duplication. C&E is done simultaneously, therefore some backlog of older accessions. New accessions are usually better described, or if collected from the wild or elsewhere, C&E is usually done ASAP after collection. Other minor deviations – e.g. active and base collection is stored at -20C.

- What other standards is your genebank using in terms of genebank management?

none

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?
 - We would be interested in certification provided it does not entail high financial and personnel/administrative burdens. We would probably not be interested in pursuing e.g. ISO certification in the near future. However, if this is a lighter form of certification (e.g. along the lines of the AEGIS AQUAS), then we would be interested in this.
 - Main support needed – a framework or checklist for the required elements. Once deficiencies in current procedures or if certain standards are not being met, then we can assess the best way to address these and to look for funding and other support sources to achieve the standards.
 - An informal external evaluation/assessment would be useful to identify what we would need to improve if we were to proceed with formal certification.

MKD Genebank at the Institute of Agriculture, North Macedonia

... The official genebank is located at the Institute of Agriculture (the answers are for this genebank). Two other institutions are maintaining small collections, and we, at the Faculty of Agricultural Sciences and Food have huge inventory collection. There is no financing from the Country for any of the activities and, moreover, there are no national projects to support collecting, characterizing, maintaining, regeneration.

...

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?

Genebank at the Institute of Agriculture

- What is number of accessions in your genebank, and type of crops (very brief)?

around 1600, in the seed genebank (wheat, barley, beans, rye, oats, tomato, pepper, cucumber, pumpkin, melon, watermelon...). The status of the collection of grapes and fruit trees is unknown

- Do you upload your information to EURISCO?

long time ago yes, now no

Quality management

- Do you have a formal quality management system? NO
 - o If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)? NO
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - o If yes, you be willing to share your documents?

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? NO
 - If yes, what part?
- Do you have a written policy regarding distribution of genebank accessions? NO
 - If yes, could you send it (we can translate it from your language into English)?
 - If no, could you briefly describe your distribution policy? The distribution of the samples is performed only by request from some institution, for scientific purposes, with MTA
- How many samples did you distribute in the period 2018-2022? 25
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.? Only to two institutions abroad, sesame and wheat

Standards

- Are you aware of the FAO Genebank Standards? Yes
 - If yes, do you think they are suitable as a basis for genebank certification? Not completely
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? It complies as much as possible, any deviation is a result of lack of personnel and almost none financial support
- What other standards is your genebank using in terms of genebank management? None

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there) Yes
 - If yes, what support would you need? Capacity building, regular financial support, employed personnel
 - If no, why not?

MNE Montenegrin gene bank – MGB, Montenegro

Identification

What is the name of the genebank, institution and if possible the FAO institution code?

Montenegrin gene bank – MGB

Placed at Biotechnical Faculty of University of Montenegro, founded in 2004, through the SEEDNet project (2004-2011)

The FAO institution code MNE001

What is number of accessions in your genebank, and type of crops (very brief)?

CEREALS		
No		
Corn	Zea mays	68
Barley	Hordeum vulgare	10
Buckwheat	Fagopyrum esculentum	6
Oats	Avena sativa	5
Rye	Secale cereale	5
Wheat	Triticum aestivum	187

LEGUMES		
Beans	Phaseolus vulgaris	11
Broadbean	Vicia faba	6
Peas	Pisum sativum	1
FODDER CROPS		
Alfalfa	Medicago sativa	7
Clover	Trifolium sp.	23
Grass	Dactylis glomerata	11
INDUSTRIAL CROPS		
Tobacco	Nicotiana tabacum	2
VEGETABLE CROPS		
Cabbage	Brassica sp.	1
Eggplant	Solanum melongena	2
Kale	B. oleracea var. acephala	9
Lettuce	Lactuca sativa	4
Melon	Cucumis melo	1
Okra	Abelmoschus esculentus	3
Onion	Allium cepa	3
Potato	Solanum tuberosum	52
Squash	Cucurbita pepo	3
Tomato	Lycopersicon esculentum	1
FRUIT CROPS		
Apple	Malus sylvestris	60
Fig	Ficus carica	12
Grapevine	Vitis vinifera	520
Olive	Olea europaea	200
Plum	Prunus domestica	15
Pomegranate	Punica granatum	21
MEDICINAL AND AROMATIC PLANTS		
Sage	Salvia officinalis	11
Immortelle	Helichrysum italicum	25

Do you upload your information to EURISCO? **Yes**

AEGIS - **Yes**

Quality management

Do you have a formal quality management system? **No. The bank has a very limited budget (mainly for regeneration) and no permanent employees**

If yes, what? (ISO 9001 or another?)

Do you have written procedures for your genebank (Standard Operating Procedures)? **No**

If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

If yes, you be willing to share your documents?

Distribution

Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? **Yes**

If yes, what part? **We send samples through MLSA upon request.**

Do you have a written policy regarding distribution of genebank accessions? **No**

If yes, could you send it (we can translate it from your language into English)?

If no, could you briefly describe your distribution policy? **Montenegro signed International Treaty on Plant Genetic Resources (ITPGRFA) in 2010. This is the basis for the distribution of our seeds from the list from Annex 1**

How many samples did you distribute in the period 2018-2022? **About 80**

Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.? **All users are research institutes from the Region and Western Europe (Serbia, Slovenia, Norway, Italy)**

Standards

Are you aware of the FAO Genebank Standards? **Yes**

If yes, do you think they are suitable as a basis for genebank certification? **Yes**

If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? It's not. **Since our bank does not have permanent employees, it is exclusively used through certain national and international projects. Many of our samples are used in research (national or EU projects)**

What other standards is your genebank using in terms of genebank management? **The entire activities (inventory, collection, characterization, conservation, regeneration, evaluation, documentation and exchange of genetic resources) Montenegrin gene bank is performing in accordance with IPGRI procedures and standards (But we don't have any standard in the local language). For morphological assessment we use Upov descriptors.**

Future

Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there) **Yes**

If yes, what support would you need?

First, we need support from our state in terms of hiring associates who will be in charge of these activities. After that we will need international support in terms of supporting the implementation of all the necessary standards and other procedures related to gene bank management

If no, why not?

NLD Centre for Genetic Resources, The Netherlands

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Centre for Genetic Resources, The Netherlands (CGN)
NLD037
- What is number of accessions in your genebank, and type of crops (very brief)?
23531, horticultural and other crops grown in the Netherlands (incl material from abroad)
- Do you upload your information to EURISCO?
yes (updated bi-monthly)

Quality management

- Do you have a formal quality management system?
yes
 - If yes, what? (ISO 9001 or another?)
ISO9001
- Do you have written procedures for your genebank (Standard Operating Procedures)?
yes
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
112 documents covering everything
 - If yes, you be willing to share your documents?
yes (in January)

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
yes
 - If yes, what part?
65%
- Do you have a written policy regarding distribution of genebank accessions?
yes
 - If yes, could you send it (we can translate it from your language into English)?
CGN distribution SOP
 - If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
18573
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
69.4% went abroad, 55.0% to private industry, total 1012 requests were answered

Standards

- Are you aware of the FAO Genebank Standards?
yes
 - If yes, do you think they are suitable as a basis for genebank certification?
yes, but not complete
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
largely yes
- What other standards is your genebank using in terms of genebank management?
SMTA for all material

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
yes
 - If yes, what support would you need?
sharing of SOPs
 - If no, why not?

PER Centro Internacional de la Papa (CIP), Peru

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
 - **CIP Genebank PER001**
- What is number of accessions in your genebank, and type of crops (very brief)?
 - **Potato: 4890 cultivated; 2500 wild relatives**
 - **Sweet Potato: 5000 cultivated; 1000 wild**

- **Nine Andean and root tuber crops: 2500**
- Do you upload your information to EURISCO?
 - **No**

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?)
 - **Yes. We were accredited in ISO 17025 until 2020. We now continue following the standards but are not accredited. We also follow the CGIAR/GCDT QMS standards and the FAO standards.**
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
 - **Yes, we do have SOPs for all our procedures. A few dozens**
 - If yes, you be willing to share your documents?
 - **Yes, most of them are already published. <see below for follow up communication>**

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - If yes, what part?
 - **Yes. Most of our collections is available for distribution under the MLS. Around 90% of the accessions, mostly potato and sweet potato.**
- Do you have a written policy regarding distribution of genebank accessions?
 - If yes, could you send it (we can translate it from your language into English)?
 - **Yes, we have an SOP. Yes, we can share.**
 - If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?
 - **14,966 samples.**
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
 - **Table being prepared.**

Distribution between 2018 – 2022 <sent later>

Row Labels	Total Requests	Requests sent abroad	Requests sent to Peru
Andean Roots and Tubers	12	1	11
CGIAR Centers	1	0.0%	100.0%
Farmer	1	0.0%	100.0%
Individual	1	0.0%	100.0%
National Agric. Research (NARS)	2	0.0%	100.0%
University	7	14.3%	85.7%
Potato	301	65	236
Advance Research Institute (ARI)	13	100.0%	0.0%
CGIAR Centers	128	0.8%	99.2%
Commercial Sector	19	42.1%	57.9%
Farmer	65	1.5%	98.5%
Individual	1	100.0%	0.0%
International Genebank	2	100.0%	0.0%
National Agric. Research (NARS)	36	80.6%	19.4%
No governmental Organiz.(NGO)	10	10.0%	90.0%
University	27	33.3%	66.7%

Sweetpotato	86	43	43
Advance Research Institute (ARI)	3	100.0%	0.0%
CGIAR Centers	30	3.3%	96.7%
Commercial Sector	14	64.3%	35.7%
Farmer	7	14.3%	85.7%
Individual	1	100.0%	0.0%
National Agric. Research (NARS)	19	100.0%	0.0%
University	12	75.0%	25.0%

Standards

- Are you aware of the FAO Genebank Standards?
 - **Yes.**
 - If yes, do you think they are suitable as a basis for genebank certification?
 - **Very basic.**
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
 - **We do comply, but we need to go much deeper to be able to manage properly a genebank.**
 - What other standards is your genebank using in terms of genebank management?
 - **The CGIAR/GCDT Quality Management Systems that we follow combines components of the FAO standards, ISO 17025, Biobanks ISO, ISTA, ITPGRFA, and CGIAR policy**

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)?
 - **Yes. In fact we are looking for an alternative to the accreditation that we had to drop (due to lack of funds) to continue being externally audited.**
- (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?
 - **People capacitated to audit a genebank and funds to cover the costs related to the activity.**
 - If no, why not?

<later after requesting the SOP's following answer was received 5-12-23>

The ones available online are not updated versions. We are reorganizing our SOPs because they were too fragmented, what made us have hundreds of documents. Also, most of them are still in Spanish only. Even though they were considered as published, due to continue need of review (as SOPs are alive documents) and consolidation that we have decided to do, they are available under request.

Please see attached the SOP for distribution (ADU-02 <011>), acquisition (ADU-01 <012>), in vitro (IVC-01 <013>) as examples. You will see that the in vitro is in draft stage since we are consolidating different SOPs in one only.

PRT Banco Português de Germoplasma Vegetal, Portugal

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Banco Português de Germoplasma Vegetal Instituto Nacional de Investigação Agrária e Veterinária, I.P., PRT001
- What is number of accessions in your genebank, and type of crops (very brief)?

Approximately 47000 accessions.

the most important collections at the portuguese genebank are: cereals, grain legumes and vegetables

- Do you upload your information to EURISCO?

All the passport information is uploaded in EURISCO and some of the characterization.

Now we are preparing all the characterization and evaluation information, with a data view from GRIN GLOBAL, to be uploaded in to EURISCO.

Quality management

- Do you have a formal quality management system? Not yet
 - o If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?

We are updating procedures for the conservation of orthodox seeds that we identify as the itinerary for the conservation of seeds. Also for the vegetative propagated species, that are conserved in vitro, cryo and field. We plan to have it finalized by June 2024.
 - o If yes, you be willing to share your documents? The documents are in Portuguese. We can try in the future to translate them.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?

Yes, our collection is part of the ITPGRFA Multilateral System
- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?

Yes we have a policy to distribute genetic material.
 - o If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022?

We had 170 requests corresponding to 3 463 samples
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?

The 3463 samples were a result 35 international requests and 135 national requests. The international requests were all from research institutions and the national ones were 15 from farmers and 120 from research institutions.

Standards

- Are you aware of the FAO Genebank Standards?
 - o If yes, do you think they are suitable as a basis for genebank certification?

Yes I'm aware of FAO Genebank Standards and I think they are suitable basis. These standards give you the support to define your own standards as well as the work flow and procedures.
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
 - o We try to comply with these standards
- What other standards is your genebank using in terms of genebank management?

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - o If yes, what support would you need?
 - o If no, why not?

I'm not sure genebanks should work towards a certification system. I think it is something to discuss among genebanks.

<follow up correspondence>

Does this imply that you do not distribute to breeding companies (or did you simply get no requests)?

We had a request from a company with whom we have a large protocol to produce seeds in organic conditions, specially vegetables. This numbers are included in the research activities, as we are supporting breeding projects.

What MTA do you use?

The sMTA

the SMTA for all material?

For all material, as it is also a way to control the genebank inventory. We think we will be able to have the request on line next year.

SRB Plant Gene Bank, Serbia

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Directorate for National Reference Laboratories, Ministry of Agriculture, Forestry and Water Management. SRB070. Plant Gene Bank is under Directorate for National Reference Laboratories
- What is number of accessions in your genebank, and type of crops (very brief)?
Number of accessions: 4300 accessions from 249 plant species, wheat and maize 70%. Other crops are industrial, vegetable, fodder crops, medicinal and aromatic.
Do you upload your information to EURISCO?
Yes, we signed Data Sharing Agreement.

Quality management

- Do you have a formal quality management system? No
 - o If yes, what? (ISO 9001 or another?)
- Do you have written procedures for your genebank (Standard Operating Procedures)? We use procedures from "Manual of Seeds Handling in Gene Banks" (Bioversity, 2006) and for standards we use GeneBank Standards we use framework documents, that should be adapted to our present situation. Procedures
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)? As in above mentioned manual.
 - o If yes, you be willing to share your documents? Above mentioned manual is translated in to Serbian.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part? Yes
- Do you have a written policy regarding distribution of genebank accessions? We use procedures from "Manual of Seeds Handling in Gene Banks" (Bioversity, 2006) and FAO Genebank Standards.
 - o If yes, could you send it (we can translate it from your language into English)?
 - o If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022? We distributed 96 accessions from FAO BSF4 project.
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.?

Standards

- Are you aware of the FAO Genebank Standards? YES
 - o If yes, do you think they are suitable as a basis for genebank certification? YES

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? YES, partially, but we are working toward full compliance.
- What other standards is your genebank using in terms of genebank management? ISTA, Rule book on the Quality of agricultural plants (Official Gazette 47/87)

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
- YES
- If yes, what support would you need? We will need capacity building: more staff, training, some equipment and financial support.
 - If no, why not?

SVN Slovene Plant Gene Bank (PGB.SI), Slovenia

... the information for Slovenia which also includes the information for the genebank at the Biotechnical Faculty, University of Ljubljana (contact person: Zlata Luthar). Details in the attached file.

...

First, a brief description of the structure of the Slovene Plant Gene Bank, which operates through Public service for conservation and sustainable use of plant genetic resources for food and agriculture (PGB.SI). Four institutions are involved in the PGB.SI: i) Agricultural Institute of Slovenia (KIS), ii) Biotechnical Faculty, University of Ljubljana, Slovenia (BF), iii) Slovenian Institute of Hop Research and Brewing (IHPS) and iv) Faculty of agriculture and life sciences, University of Maribor (FKBV). Agricultural Institute of Slovenia is responsible for coordination of the PGB.SI, and I am the responsible person – coordinator of the programme/service.

In the answer to your questions below I tried to gather the information for all the four institutions/genebanks (where appropriate/available).

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
Genebank of the Agricultural Institute of Slovenia (KIS) (FAO code: SVN019)
Genebank of the Biotechnical Faculty, University of Ljubljana, Slovenia (BF) (FAO code: SVN018)
Genebank of the Slovenian Institute of Hop Research and Brewing (IHPS) (FAO code: SVN040)
Genebank at the Faculty of agriculture and life sciences, University of Maribor (FKBV) (FAO code: SVN043)
- What is number of accessions in your genebank, and type of crops (very brief)?
Genebank of KIS: app. 3250 accessions (vegetables, fodder crops, potato, cereals, small berries, grapevine)
Genebank of BF: app. 1650 accessions (cereals, maize, forage crops, fruit trees, medicinal and aromatic plants)
Genebank of IHPS: app. 270 accessions (hop, medicinal and aromatic plants)
Genebank of FKBV: app. 330 accessions (fruit trees, grapevine)
- Do you upload your information to EURISCO?
Genebank of KIS: uploaded in EURISCO (updated in 2021)
Genebank of BF: only partly uploaded in EURISCO (to be updated early in 2024)
Genebanks of IHPS and FKBV: not yet included in EURISCO (to be included early in 2024)

Quality management

- Do you have a formal quality management system? Yes for KIS
 - o If yes, what? (ISO 9001 or another?)
KIS: ISO 9001, Seed testing laboratory at KIS has ISTA accreditation
- Do you have written procedures for your genebank (Standard Operating Procedures)? Yes
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
General procedures (i.e. for acquisition/inclusion of new accessions, for distribution, for storage, for reporting, for inclusion of accessions in European Collection and MLS);
Manuals (SOPs) for management of individual collection /crop species (16 manuals altogether).
 - o If yes, you be willing to share your documents?
Yes, but the documents are in Slovene language.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? YES
 - o If yes, what part?
KIS: at the moment less than 10% (to be increased)
BF: at the moment 6% (to be increased)
- Do you have a written policy regarding distribution of genebank accessions? Yes, but the document will be updated
 - o If yes, could you send it (we can translate it from your language into English)?
Yes, when updated.
 - o If no, could you briefly describe your distribution policy?
All the material (also non Annex I crops) is distributed upon signature of SMTA
- How many samples did you distribute in the period 2018-2022?
KIS: 244
BF: 60
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
KIS: 26 requests (SMTAs issued), 70% sent abroad
BF: 7 (SMTAs issued), 70% sent abroad

User categories: Mostly for research purposes for both genebanks, KIS and BF

Standards

- Are you aware of the FAO Genebank Standards? Yes
 - o If yes, do you think they are suitable as a basis for genebank certification? Yes, as a basis
 - o If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?
In general terms it complies with the standards, but there are still items to be improved (e.g. long-term storage, safety duplication)
- What other standards is your genebank using in terms of genebank management?
KIS: ISO 9001, ISTA for seed germination and viability testing

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
Yes for KIS
 - o If yes, what support would you need?
Help to persuade the managers/competent persons (at the institute as well as at the ministry) of the importance of the genebank quality system; financial support will be needed as well.
 - o If no, why not?

SWE Nordic Genetic Resource Centre (NordGen), Sweden

Identification

- What is the name of the genebank, institution and if possible the FAO institution code?
NordGen – the Nordic Genetic Resource Centre
FAO WIEWS code: SWE054
- What is number of accessions in your genebank, and type of crops (very brief)?
The Active collection at NordGen consists of over 33 000 accessions. Of these over 26 000 are part of the core collection and conserved long-term (viability monitoring and regeneration when needed)
NordGen's mandate is to conserve all seed propagated crops of relevance to the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden), as well as their wild relatives.
- Do you upload your information to EURISCO?
Yes.

Quality management

- Do you have a formal quality management system?
 - o If yes, what? (ISO 9001 or another?)
No, we have an informal management system.
- Do you have written procedures for your genebank (Standard Operating Procedures)?
 - o If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)?
We do have written procedures. Today there are over 280 approved quality assurance documents and of these nearly 20 are policy and overview documents and the rest are mainly working instructions and a few forms.
 - o If yes, you be willing to share your documents?
Yes, we are willing to share most of these documents. Many are in English, but some are in a Nordic language.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)?
 - o If yes, what part?
All NordGen's accessions are distributed under the FAO Standard Material Transfer Agreement (SMTA). The accessions of species in Annex 1 of the ITPGRFA are specifically flagged in our database as part of the Multilateral System.
- Do you have a written policy regarding distribution of genebank accessions?
 - o If yes, could you send it (we can translate it from your language into English)?
On our webpages we have a short text on distribution policy, see <https://nordic-baltic-genebanks.org/gringlobal/distributionpolicy>
In addition, we have document within our quality assurance system describing our distribution policy in more detail. This can be provided upon request.
- How many samples did you distribute in the period 2018-2022?
During this period, we distributed 19243 seed samples.
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage sent abroad, user categories, etc.?
During this time period we had 879 seed requests, of which 65% were sent abroad.
Users: universities, research/breeding institutes, museums/education, seed savers, and other/private

Standards

- Are you aware of the FAO Genebank Standards?
 - o If yes, do you think they are suitable as a basis for genebank certification?

Yes, we are aware of the FAO Genebank Standards, and think that they could serve as a basis/starting point for a certification system. However, the standards need to be updated and, in some cases, further developed.

- If yes, do you think your genebank complies to these standards; in what terms does it deviate and why?

Examples of deviations:

- A. **Genbank Standards 4.1:** For self-pollinated species we accept down to 10 collected individuals per population but encourage sampling of several populations to compensate. This is because scientific literature suggests low diversity within populations of self-pollinated species, and high differentiation among populations. In addition, no/few problems with inbreeding depression are expected in self-pollinated species. (For cross-pollinating species, we follow FAO with a minimum of 30 collected individuals, but recommend sampling of 100)
- B. **Genbank Standards 4.2:** We don't control the humidity in the long-term storage, all the samples are packed in hermetically sealed 3-ply aluminum bags.
- C. **GenBank Standards 4.3:** We accept 85% or higher viability for standard accessions. The viability interval is 10 years for less-known crops, while for specific taxa, we have an initial viability interval of 25 years if there is scientific evidence to support this.

All viability tests are performed on 50 seeds, regardless of taxa and the amount of seed available. If the viability test is lower than the threshold, a second test is performed before the accession is set for regeneration.

- D. **GenBank Standards 4.4:** We regenerate an accession when the viability drops below the viability threshold (default 85%)

- What other standards is your genebank using in terms of genebank management?

We are using our internal Quality assurance system, which is based on FAO Gene Bank standards, ECPGR crop specific standards and scientific literature.

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)

Yes, we are interested in working towards certification.

- If yes, what support would you need?

Depends on the certification system and the set-up. So, at this very moment it is not possible to give an answer to this question.

- If no, why not?

Depends on the certification system and the set-up. So, at this very moment it is not possible to give an answer to this question.

TWN World Vegetable Centre (WorldVeg), Taiwan

Identification

- What is the name of the genebank, institution and if possible the FAO institution code? World Vegetable Center Genebank, TWN001

- What is number of accessions in your genebank, and type of crops (very brief)? 59,236(Taiwan), 5,622(Tanzania). Vegetables include legumes, tomatoes, peppers, eggplants, brassica, cucurbit, okra, and other vegetables.
- Do you upload your information to EURISCO? No, we upload to Genesys.

Quality management

- Do you have a formal quality management system?
 - If yes, what? (ISO 9001 or another?) No
- Do you have written procedures for your genebank (Standard Operating Procedures)? Yes
 - If yes, could you briefly indicate the scale (number of procedures, instructions, etc.)? 1 quality manual (level 1 documents), and have been approved. 7 main quality procedures (level 2 documents), two of them have been approved. More than 30 SOPs (level 3 documents).
 - If yes, you be willing to share your documents? We are willing the share the approved procedures.

Distribution

- Is part of your collection part of the ITPGRFA Multilateral System (the MLS)? Yes
 - If yes, what part?
- Do you have a written policy regarding distribution of genebank accessions? The policy of distribution should follow the quality procedure of distribution.
 - If yes, could you send it (we can translate it from your language into English)? Yes.
 - If no, could you briefly describe your distribution policy?
- How many samples did you distribute in the period 2018-2022? 26,254 accessions had been distributed between Aug. 2019 - Dec. 2022. The information from 2018- July 2019 is on the paper, not in the database. It would require a temporary assistant to upload that legacy data.
- Can you give statistics regarding the distribution in the period 2018-2022 in terms of numbers of requests, percentage send abroad, user categories, etc.? The data from Aug. 2019 are available. But from 2018 – July 2019 is not in the database. It would require a temporary assistant to upload that legacy data.

Standards

- Are you aware of the FAO Genebank Standards? Yes
 - If yes, do you think they are suitable as a basis for genebank certification? Yes, and updates can be done in line with the FAO.
 - If yes, do you think your genebank complies to these standards; in what terms does it deviate and why? Not yet, we are in the process of working towards these standards with support of the Global Crop Diversity Trust, and received our first external genebank review.
- What other standards is your genebank using in terms of genebank management?
 - The International Seed Testing Association for monitoring seed viability.
 - International Standards for Phytosanitary Measures ISPM No. 31 Methodologies for Sampling of Consignments

Future

- Would your genebank be interested in working towards certification (i.e. improve protocols to meet standards that we agree on and be open to external auditing)? (This involves a commitment of your organisation and will come with extensive capacity building and other support to get there)
 - If yes, what support would you need?

- If no, why not?

Yes.

To avoid is the establishment of parallel systems of implementing genebank standards e.g. (PROGRACE, Crop Trust, and FAO), I believe there should be alignment between PROGRACE, the efforts of the Global Crop Diversity Trust to implement genebank quality management systems in national and international genebanks, and with the FAO. Even if the systems are slightly different, they should be able to connected. - In the certification and standardization, the service to users should in my view be up front. This will help to identify top priority standards and also areas where more flexibility is allowed. - In my view, there should be sufficient flexibility in standardization –several options- to implement genebank quality management systems with available resources. For instance, seed health testing procedures can be implemented at the front-end (before storage) or at the back-end (before distribution or regeneration), which has its pros and contras.

What I also believe is the benefit of working groups around specific crops and peer-reviews by genebank colleagues. This can complement standardization and certification of more general procedures, and allows to work towards common practices for specific crops. So a standardization systems would consists of different level: i) general standards; ii) specific standards for crops developed by working groups; iii) peer-review system that underpins the practical implementation of standards.

<a follow-up addition>

... Another point is to which extent the standardization in PROGRACE of pre-dominantly EU genebanks can be extended across the world and/or linked to global efforts such as of the Crop Trust. It would good to link or harmonize these different initiatives as they have a common goal. At WorldVeg we are interested to be involved in PROGRACE standardization, I see that it can only reinforce the efforts that we do to comply with the Crop Trust KPIs. It would be good to clarify that in the text.

Besides developing general standards, perhaps there are specific operations or KPIs where PROGRACE can play a global leadership role in standardization. What about characterization considering the linkages of research institutions and Genebanks in PROGRACE? What about crop-specific operations considering the expertise of the ECPGR crop working groups? It could be interesting to look at NORDGEN, as a case study, and how they play a leadership role in safety duplication with the SVSG, which is essential for quality management of genebanks across the world. The CGIAR made good progress in seed health for their crop portfolio; that could be another case study that can provide lessons learned. ...

Acknowledgement

The author of the survey, Theo van Hintum, would like to thank all genebank managers contributing to this report, who were willing and able to submit their feedback within the time available. Their input and this report will help in improving our collaborative work towards achieving our common goal: proper conservation of plant genetic resources. So, thank you Kylli Annamaa (Estonia), Alvina Avagyan (Armenia), Vania Azevedo (Peru), Ana Maria Barata (Portugal), Béla Bartha (Swiss), Angjelina Belaj (Spain), Maja Boczkowska (Poland), Manon Bouet (France), Noam Chayut (UK), Clément Debiton (France), Marine Delmas (France), Gordana Djuric (Bosnia and Herzegovina), Florence Esnault (France), Laurence Feugey (France), Emmanuel Geoffriau (France), Luis Guasch (Spain), Vojtech Holubec (Czech Republic), Mirjana Jankulovska (North Macedonia), Maja Jecmenica (Serbia), Tamar Jinjikhadze (Georgia), Zoran Jovović (Montenegro), Gaetano Laghetti (Italy), Marc Lateur (Belgium), Lasse Lose (Denmark), Einav Mayzlish Gati (Israel), Gaynor McKenzie (UK), Brian O'Connor (Ireland), Matt Ordidge (UK), Anna Palmé (Sweden), Alix Pernet (France), Jaime Prohens (Spain),

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ANNEX 2- FAO/IPGRI MULTI-CROP PASSPORT DESCRIPTORS - December 2001

The list of multi-crop passport descriptors (MCPD) is developed jointly by IPGRI and FAO to provide international standards to facilitate germplasm passport information exchange. These descriptors aim to be compatible with IPGRI crop descriptor lists and with the descriptors used for the FAO World Information and Early Warning System (WIEWS) on plant genetic resources (PGR).

For each multi-crop passport descriptor, a brief explanation of content, coding scheme and *suggested* fieldname (in parentheses) is provided to assist in the computerized exchange of this type of data. It is recognized that networks or groups of users may want to further expand this MCPD List to meet their specific needs. As long as these additions allow for an easy conversion to the format proposed in the multi-crop passport descriptors, basic passport data can be exchanged worldwide in a consistent manner.

General comments:

- If a field allows multiple values, these values should be separated by a semicolon (;) without space(s), (i.e. Accession name: Rheinische Vorgebirgstrauben; Emma; Avlon).
- A field for which no value is available should be left empty (i.e. Elevation). If data are exchanged in ASCII format for a field with a missing numeric value, it should be left empty. If data are exchanged in a database format, missing numeric values should be represented by generic NULL values.
- Dates are recorded as YYYYMMDD. If the month and/or day are missing this should be indicated with hyphens. Leading zeros are required (i.e. 197506--, or 1975).
- Latitude and longitude are recorded in an alphanumeric format. If the minutes or seconds are missing, this should be indicated with hyphens. Leading zeros are required.
- Country names: Three letter ISO codes are used for countries.
The ISO 3166-1: Code List and the Country or the Country or area numerical codes added or changed are not available on-line, but can be obtained from IPGRI [ipgri-mcpd@cgiar.org]
- For institutes the codes from FAO should be used. These codes are available from <http://apps3.fao.org/wiews/> for registered WIEWS users. From the Main Menu select: 'PGR' and 'Download'. If new Institute Codes are required, they can be generated online by national WIEWS administrators, or by the FAO WIEWS administrator [Stefano.Diulgheroff@fao.org].
- The preferred language for free text fields is English (i.e. Location of collecting site and Remarks).

MULTI-CROP PASSPORT DESCRIPTORS	
1. Institute code	(INSTCODE)
Code of the institute where the accession is maintained. The codes consist of the 3-letter ISO 3166 country code of the country where the institute is located plus a number. The current set of Institute Codes is available from the FAO website (http://apps3.fao.org/wiews/).	
2. Accession number	(ACCENUMB)
This number serves as a unique identifier for accessions within a genebank collection, and is assigned when a sample is entered into the genebank collection.	
3. Collecting number	(COLLNUMB)
Original number assigned by the collector(s) of the sample, normally composed of the name or initials of the collector(s) followed by a number. This number is essential for identifying duplicates held in different collections.	
4. Collecting institute code	(COLLCODE)
Code of the Institute collecting the sample. If the holding institute has collected the material, the collecting institute code (COLLCODE) should be the same as the holding institute code (INSTCODE). Follows INSTCODE standard.	
5. Genus	(GENUS)
Genus name for taxon. Initial uppercase letter required.	

6. Species	(SPECIES)
Specific epithet portion of the scientific name in lowercase letters. Following abbreviation is allowed: 'sp.'	
7. Species authority	(SPAUTHOR)
Provide the authority for the species name.	
8. Subtaxa	(SUBTAXA)
Subtaxa can be used to store any additional taxonomic identifier. Following abbreviations are allowed: 'subsp.' (for subspecies); 'convar.' (for convariety); 'var.' (for variety); 'f.' (for form).	
9. Subtaxa authority	(SUBTAUTHOR)
Provide the subtaxa authority at the most detailed taxonomic level.	
10. Common crop name	(CROPNAME)
Name of the crop in colloquial language, preferably English (i.e. 'malting barley', 'cauliflower', or 'white cabbage')	
11. Accession name	(ACCENAME)
Either a registered or other formal designation given to the accession. First letter uppercase. Multiple names separated with semicolon without space. For example: Rheinische Vorgebirgstrauben;Emma;Avlon	
12. Acquisition date [YYYYMMDD]	(ACQDATE)
Date on which the accession entered the collection where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens. Leading zeros are required.	
13. Country of origin	(ORIGCTY)
Code of the country in which the sample was originally collected. Use the 3-letter ISO 3166-1 extended country codes.	
14. Location of collecting site	(COLLSITE)
Location information below the country level that describes where the accession was collected. This might include the distance in kilometres and direction from the nearest town, village or map grid reference point, (e.g. 7 km south of Curitiba in the state of Parana).	
15. Latitude of collecting site¹	(LATITUDE)
Degree (2 digits) minutes (2 digits), and seconds (2 digits) followed by N (North) or S (South) (e.g. 103020S). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 10 S; 011530N; 4531--S).	
16. Longitude of collecting site¹	(LONGITUDE)
Degree (3 digits), minutes (2 digits), and seconds (2 digits) followed by E (East) or W (West) (e.g. 0762510W). Every missing digit (minutes or seconds) should be indicated with a hyphen. Leading zeros are required (e.g. 076 ----- W).	
17. Elevation of collecting site [m asl]	(ELEVATION)
Elevation of collecting site expressed in metres above sea level. Negative values are allowed.	
18. Collecting date of sample [YYYYMMDD]	(COLLDATE)
Collecting date of the sample where YYYY is the year, MM is the month and DD is the day. Missing data (MM or DD) should be indicated with hyphens. Leading zeros are required.	

¹ To convert from longitude and latitude in degrees (°), minutes ('), seconds ("), and a hemisphere (North or South and East or West) to decimal degrees, the following formula should be used:

$$d^{\circ} m' s'' = h * (d + m/60 + s/3600)$$

where h=1 for the Northern and Eastern hemispheres and -1 for the Southern and Western hemispheres i.e. 30°30'0" S = -30.5 and 30°15'55" N = 30.265.

19. Breeding institute code	(BREDCODE)
Institute code of the institute that has bred the material. If the holding institute has bred the material, the breeding institute code (BREDCODE) should be the same as the holding institute code (INSTCODE). Follows INSTCODE standard.	
20. Biological status of accession	(SAMPSTAT)
The coding scheme proposed can be used at 3 different levels of detail: either by using the general codes (in boldface) such as 100, 200, 300, 400 or by using the more specific codes such as 110, 120 etc.	
100) Wild	
110) Natural	
120) Semi-natural/wild	
200) Weedy	
300) Traditional cultivar/landrace	
400) Breeding/research material	
410) Breeder's line	
411) Synthetic population	
412) Hybrid	
413) Founder stock/base population	
414) Inbred line (parent of hybrid cultivar)	
415) Segregating population	
420) Mutant/genetic stock	
500) Advanced/improved cultivar	
999) Other (Elaborate in REMARKS field)	
21. Ancestral data	(ANCEST)
Information about either pedigree or other description of ancestral information (i.e. parent variety in case of mutant or selection). For example a pedigree 'Hanna/7*Atlas//Turk/8*Atlas' or a description 'mutation found in Hanna', 'selection from Irene' or 'cross involving amongst others Hanna and Irene'.	
22. Collecting/acquisition source	(COLLSRC)
The coding scheme proposed can be used at 2 different levels of detail: either by using the general codes (in boldface) such as 10, 20, 30, 40 or by using the more specific codes such as 11, 12 etc.	
10) Wild habitat	
11) Forest/woodland	
12) Shrubland	
13) Grassland	
14) Desert/tundra	
15) Aquatic habitat	
20) Farm or cultivated habitat	
21) Field	
22) Orchard	
23) Backyard, kitchen or home garden (urban, peri-urban or rural)	
24) Fallow land	
25) Pasture	
26) Farm store	
27) Threshing floor	
28) Park	

30) Market or shop 40) Institute, Experimental station, Research organization, Genebank 50) Seed company 60) Weedy, disturbed or ruderal habitat 61) Roadside 62) Field margin 99) Other (Elaborate in REMARKS field)	
23. Donor institute code Code for the donor institute. Follows INSTCODE standard.	(DONORCODE)
24. Donor accession number Number assigned to an accession by the donor. Follows ACCENUMB standard.	(DONORNUMB)
25. Other identification (numbers) associated with the accession Any other identification (numbers) known to exist in other collections for this accession. Use the following system: INSTCODE:ACCENUMB;INSTCODE:ACCENUMB;... INSTCODE and ACCENUMB follow the standard described above and are separated by a colon. Pairs of INSTCODE and ACCENUMB are separated by a semicolon without space. When the institute is not known, the number should be preceded by a colon.	
26. Location of safety duplicates Code of the institute where a safety duplicate of the accession is maintained. Follows INSTCODE standard.	(DUPLSITE)
27. Type of germplasm storage If germplasm is maintained under different types of storage, multiple choices are allowed, separated by a semicolon (e.g. 20;30). (Refer to FAO/IPGRI Genebank Standards 1994 for details on storage type.)	
10) Seed collection 11) Short term 12) Medium term 13) Long term 20) Field collection 30) <i>In vitro</i> collection (Slow growth) 40) Cryopreserved collection 99) Other (elaborate in REMARKS field)	
28. Remarks The remarks field is used to add notes or to elaborate on descriptors with value 99 or 999 (=Other). Prefix remarks with the field name they refer to and a colon (e.g. COLLSRC:riverside). Separate remarks referring to different fields are separated by semicolons without space.	(REMARKS)

ANNEX 3 Standards for orthodox seeds from the FAO Genebank Standards (2013)

1 Standards for acquisition of germplasm

- 1.1 All seed samples added to the genebank collection have been acquired legally with relevant technical documentation.
- 1.2 Seed collecting should be made as close as possible to the time of maturation and prior to natural seed dispersal, avoiding potential genetic contamination, to ensure maximum seed quality.
- 1.3 To maximize seed quality, the period between seed collecting and transfer to a controlled drying environment should be within 3 to 5 days or as short as possible, bearing in mind that seeds should not be exposed to high temperatures and intense light and that some species may have immature seeds that require time after harvest to achieve embryo maturation.
- 1.4 All seed samples should be accompanied by at least a minimum of associated data as detailed in the FAO/Bioversity multi-crop passport descriptors.
- 1.5 The minimum number of plants from which seeds should be collected is between 30-60 plants, depending on the breeding system of the target species.

2 Standards for drying and storage

- 2.1 All seed samples should be dried to equilibrium in a controlled environment of 5–20 °C and 10–25 percent of relative humidity, depending upon species.
- 2.2 After drying, all seed samples need to be sealed in a suitable airtight container for long-term storage; in some instances where collections that need frequent access to seeds or likely to be depleted well before the predicted time for loss in viability, it is then possible to store seeds in non-airtight containers.
- 2.3 Most-original-samples and safety duplicate samples should be stored under long-term conditions (base collections) at a temperature of -18 ± 3 °C and relative humidity of 15 ± 3 percent.
- 2.4 For medium-term conditions (active collection), samples should be stored under refrigeration at 5–10 °C and relative humidity of 15 ± 3 percent.

3 Standards for seed viability monitoring

- 3.1 The initial seed viability test should be conducted after cleaning and drying the accession or at the latest within 12 months after receipt of the sample at the genebank.
- 3.2 The initial germination value should exceed 85 percent for most seeds of cultivated crop species. For some specific accessions and wild and forest species that do not normally reach high levels of germination, a lower percentage could be accepted.
- 3.3 Viability monitoring test intervals should be set at one-third of the time predicted for viability to fall to 85 percent of initial viability or lower depending on the species or specific accessions, but no longer than 40 years. If this deterioration period cannot be estimated and accessions are being held in long-term storage at -18°C in hermetically closed containers, the interval should be ten years for species expected to be long-lived and five years or less for species expected to be short-lived.
- 3.4 The viability threshold for regeneration or other management decision such as recollection should be 85 percent or lower depending on the species or specific accessions of initial viability.

4 Standards for regeneration

- 4.1 Regeneration should be carried when the viability drops below 85 percent of the initial viability or when the remaining seed quantity is less than what is required for three sowings of a representative population of the accession. The most-original-sample should be used to regenerate those accessions.

4.2 The regeneration should be carried out in such a manner that the genetic integrity of a given accession is maintained. Species-specific regeneration measures should be taken to prevent admixtures or genetic contamination arising from pollen geneflow that originated from other accessions of the same species or from other species around the regeneration fields.

4.3 If possible at least 50 seeds of the original and the subsequent most-original- samples should be archived in long-term storage for reference purposes.

5 Standards for characterization

5.1 Around 60 percent of accessions should be characterized within five to seven years of acquisition or during the first regeneration cycle.

5.2 Characterization should be based on standardized and calibrated measuring formats and characterization data follow internationally agreed descriptor lists and are made publicly available.

6 Standards for evaluation

6.1 Evaluation data on genebank accessions should be obtained for traits that are included in internationally agreed crop descriptor lists. They should conform to standardized and calibrated measuring formats.

6.2 Evaluation data should be obtained for as many accessions as practically possible, through laboratory, greenhouse and/or field analysis as may be applicable.

6.3 Evaluation trials should be carried out in at least three environmentally diverse locations and data collected over at least three years.

7 Standards for documentation

7.1 Passport data of 100 percent of the accessions should be documented using FAO/bioversity multi-crop passport descriptors.

7.2 All data and information generated in the genebank relating to all aspects of conservation and use of the material should be recorded in a suitably designed database.

8 Standards for distribution and exchange

8.1 Seeds should be distributed in compliance with national laws and relevant international treaties and conventions.

8.2 Seed samples should be provided with all relevant documents required by recipient country.

8.3 The time span between receipt of a request for seeds and the dispatch of the seeds should be kept to a minimum.

8.4 For most species, a sample of a minimum of 30–50 viable seeds should be supplied for accessions with sufficient seeds in stock. For accessions with too little seed at the time of request and in the absence of a suitable alternative accession, samples should be supplied after regeneration/multiplication, based on a renewed request. For some species and some research uses, smaller numbers of seeds should be an acceptable distribution sample size.

9 Standards for safety duplication

9.1 A safety duplicate sample for every original accession should be stored in a geographically distant area, under the same or better conditions than those in the original genebank.

9.2 Each safety duplicate sample should be accompanied by relevant associated information.

10 Standards for security and personnel

10.1 A genebank should have a risk management strategy in place that includes inter alia measures against power cut, fire, flooding and earthquakes.

- 10.2 A genebank should follow the local Occupational Safety and health requirements and protocols where applicable.
- 10.3 A genebank should employ the requisite staff to fulfil all the routine responsibilities to ensure that the genebank can acquire, conserve and distribute germplasm according to the standards.